

ASME B18.3-1998
(Revision of ASME/ANSI B18.3-1986)

SOCKET CAP, SHOULDER, AND SET SCREWS, HEX AND SPLINE KEYS (INCH SERIES)

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers



The American Society of
Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

SOCKET CAP, SHOULDER, AND SET SCREWS, HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998
(Revision of ASME/ANSI B18.3-1986)

Date of Issuance: July 22, 1998

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda or written interpretations of the requirements of this Standard issued to this edition.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable Letters Patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations issued in accordance with governing ASME procedures and policies which precludes the issuance of interpretations by individual volunteers.

No part of this document may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

Copyright © 1998 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All Rights Reserved
Printed in U.S.A.

FOREWORD

(This Foreword is not part of ASME B18.3-1998.)

American National Standards Committee B18 for the standardization of bolts, screws, nuts, rivets, and similar fasteners was organized in March 1922 as Sectional Committee B18 under the aegis of the American Engineering Standards Committee (later the American Standards Association, then the United States of America Standards Institute and, as of October 6, 1969, the American National Standards Institute) with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors.

Subcommittee No. 9¹ on Socket Head Cap and Set Screws was organized in April 1929 and completed its first report in November 1931. Seven successive drafts were issued during which the content of the proposal was considerably extended and refined, and in March 1933 copies were distributed to industry for criticism and comment. The suggestions received were carefully reviewed, and in April 1935 the proposal was presented to the members of Sectional Committee B18 for letter ballot vote. Following the acceptance by the two sponsor organizations, it was designated an American Standard (ASA B18.3) in February 1936 by the American Standards Association.

For the purpose of keeping the work of the Subcommittee in line with the developments in industry, the Committee prepared a supplement to the standard in the form of a table covering the dimensions of hexagonal and fluted socket head shoulder screws (stripper bolts) optional, which received approval of the American Standards Association in April 1944 and was designated ASA B18.3a.

In March 1945, the Subcommittee submitted certain fundamental changes and additions to the standard, and the Sectional Committee recommended issuance of a completely revised standard. Following approval of the Sectional Committee, the revised document was approved by the sponsor organizations and the American Standards Association and designated an American Standard in April 1947.

In accordance with ASA procedure, a review of the standard was undertaken in 1950 and certain additional changes were recommended by the Subcommittee. Cap screw sizes No. 0 and 1 and set screw sizes No. 0, 1, 2, 3, and 4 were added to satisfy increasing demand from various industries. Material, hardness, and thread fit were included to provide a more complete standard. A draft dated November 1951 was distributed to industry for criticism and comment. A further revision, dated November 1953, was presented to Sectional Committee B18 for letter ballot vote. Following approval of the Sectional Committee and sponsors, the proposal was submitted to the American Standards Association. It was approved and designated an American Standard on August 26, 1954.

Shortly after the 1954 standard was issued, work was initiated on the development of standards covering flat countersunk head cap screws, button head cap screws, and cap screws up to 4 in. in diameter. As these proposals evolved with comments received from various industries, it became evident that a major revision was required, particularly in regard to insufficient bearing surface under the head on some sizes as well as increased

¹ As of April 1, 1966, Subcommittee 9 was redesignated as Subcommittee 3.

socket sizes to permit higher set-up torque. The resulting proposed revision was presented to Sectional Committee B18 for letter ballot vote. Following approval of the Sectional Committee and sponsors, the proposal was submitted to the American Standards Association. It was approved and designated an American Standard on December 21, 1961.

Continued surveillance of the 1961 standard by the Subcommittee indicated by 1966 that a complete revision of the document was necessary to provide recognition of technical improvements in materials and manufacturing methods. Work over the next two years culminated in a March 1968 draft proposal incorporating revisions in the following areas: more clearly defined materials for all products; application of Unified radius root threads to all cap screws; refinements to underhead fillets; extension of size coverage for flat countersunk head cap screws to include $\frac{7}{8}$ in. through $1\frac{1}{2}$ in. diameters, and tabulation of body and grip lengths for sizes 0 in. through 1 in.; increased key engagements in socket set screws and implementation of minimum hexagon key engagement in short length set screws; addition of width across corner dimensions for hexagon keys and bits; and the inclusion of appendices covering drill and counterbore sizes for socket head cap screws (1960 Series), and gages and gaging for spline sockets. Following acceptance of this draft by the Subcommittee, it was approved by letter ballot of USA Standards Committee B18 and the sponsor organizations, and submitted to the United States of America Standards Institute. It was approved and designated a USA Standard on September 19, 1969.

A periodic review of the standard, undertaken by Subcommittee 3 in 1973, resulted in agreement that the document be revised to reflect clarification of the underhead fillet on socket head cap screws, add coverage on drilled socket head cap screws, lengthen the thread undercut on socket head shoulder screws, and extend the coverage on the latter to include the $1\frac{1}{2}$ in., $1\frac{3}{4}$ in., and 2 in. sizes. A proposal incorporating these changes together with numerous editorial corrections was prepared and, subsequent to Subcommittee acceptance, approved by letter ballot to American National Standards Committee B18. Following approval by the sponsor organizations, the proposal was submitted to the American National Standards Institute and designated an American National Standard on November 1, 1976.

A periodic review of the standard, undertaken by the Subcommittee in 1980, resulted in agreement that the document be revised to clarify the notes on screw point chamfers; be revised in socket tolerances for large sockets and in counterbore sizes to reflect standard tooling; and be revised to reference the ASTM document A 574 for the appropriate mechanical and chemical requirements. A proposal containing these changes, as well as many editorial corrections, was prepared for and balloted by letter ballot to the ASME Committee B18. Following approval by the sponsor organization, the proposal was submitted to the American National Standards Institute and designated an American National Standard on January 4, 1982.

A periodic review of the standard, undertaken by the Committee in 1985, resulted in agreement that the document be revised to clarify the dimensions with respect to plated products, and to incorporate by reference the new ASTM documents for the appropriate mechanical, chemical, and testing requirements for the button head, flat countersunk head, and set screw products. A proposal containing these changes, as well as editorial corrections, was prepared and balloted by letter ballot to ASME Committee B18. Following approval by ASME, the proposal was submitted to the American National Standards Institute and designated an American National Standard on August 7, 1986.

A periodic review of this Standard was undertaken by the Committee in 1990. Based on this review, it was determined that the document needed significant revisions to clarify and update the Standard. These revisions would need to address the technical changes in manufacturing methods and changes in the standards community. To accomplish this objective, established quality standards were recognized and integrated into the Standard. In addition,

designated characteristics for each product and product identification were established and gaging techniques for countersunk screws were added. These changes were balloted and approved by the ASME B18 Committee. The proposal was submitted to the American National Standards Institute and designated an American National Standard on January 14, 1998.

ASME B18 STANDARDS COMMITTEE

Standardization of Bolts, Nuts, Rivets, Screws, Washers, and Similar Fasteners

(The following is the roster of the Committee at the time of approval of this Standard.)

OFFICERS

D. A. Clever, *Chair*
R. Strong, *Vice Chair*
S. W. Vass, *Vice Chair*
K. M. Padilla, *Secretary*

COMMITTEE PERSONNEL

J. C. Akins, Safety Socket Screw Corp.
J. Altman, Rotor Clip Co.
J. B. Belford, Lawson Products, Inc.
D. J. Broomfield, Illinois Tool Works, Inc.
J. A. Buda, SPS Technologies, Inc.
R. M. Byrne, Trade Association Management, Inc.
D. A. Clever, Deere & Co.
A. P. Cockman, Ford Motor Co.
T. Collier, Cam-Tech Industries, Inc.
A. C. DiCola, Wrought Washer Manufacturing, Inc.
A. Dinh, Defense Industrial Supply Ctr.
W. D. Downing, Black & Decker
B. A. Dusina, Federal Screw Works
D. S. George, Ford Motor Co.
R. J. Harrington, Spirol International Corp.
B. Hasiuk, Defense Industrial Supply Ctr.
A. Herskovitz, U.S. Army
J. A. Hman, Rotor Clip Co.
A. C. Hood, ACH Technologies
J. Hubbard, Rockford Fastener, Inc.
F. W. Kern, Society of Automotive Engineers
W. H. Kopke, ITW Shakeproof Industrial Products
P. D. Korsmo, Consultant
J. G. Langenstein, Caterpillar, Inc.
M. Levinson, ITW Shakeproof Industrial Products
J. B. Levy, Consultant
L. L. Lord, Caterpillar, Inc.
A. D. McCrindle, Stelco Fasteners, Ltd.
K. E. McCullough, Consultant
D. J. Miley, Caterpillar, Inc.
R. F. Novotny, Textron
M. D. Prasad, General Motors Corp.
W. Schevey, BGM Fastener Co., Inc.
J. Slass, *Alternate*, Rotor Clip Co.
R. D. Strong, General Motors Corp.
J. F. Sullivan, National Fasteners Distribution Assoc.

R. L. Tennis, Caterpillar, Inc.
 S. W. Vass, Lake Erie Screw Corp./IFI
 R. G. Weber, BEI School of Engineering
 C. J. Wilson, Industrial Fasteners Institute
 R. B. Wright, Wright Tools Co.
 J. G. Zeratsky, National Rivet & Manufacturing Co.

SUBCOMMITTEE 3 — SOCKET HEAD, CAP, AND SET SCREWS

J. C. Akins, *Chair*, Safety Socket Screw Corp.
 J. A. Buda, SPS Technologies, Inc.
 R. M. Byrne, Trade Association Management, Inc.
 T. Collier, Cam-Tech Industries, Inc.
 A. Dinh, Defense Industrial Supply Ctr.
 J. Greenslade, Greenslade & Co.
 A. Herskovitz, U.S. Army
 M. W. Holubecki, Electric Boat Corp.
 F. Howard, General Dynamics
 J. Hubbard, Rockford Fastener, Inc.
 R. W. Kerr, Kerr Lakeside, Inc.
 L. L. Lord, Caterpillar, Inc.
 K. E. McCullough, Consultant
 D. J. Miley, Caterpillar, Inc.
 R. F. Novotny, Camcar
 L. Pieninck, Defense Industrial Supply Ctr.
 J. A. Schlink, Caterpillar, Inc.
 L. C. Schroeder, Kansas Dept. of Transportation
 R. D. Strong, General Motors Corp.
 J. F. Sullivan, National Fasteners Distributors Assoc.
 R. L. Tennis, Caterpillar, Inc.
 J. Tyler, Holo-Krome
 C. B. Wackrow, MNP Corp.
 W. K. Wilcox, Naval Sea Systems Command
 C. J. Wilson, Industrial Fasteners Institute

CORRESPONDENCE WITH B18 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending committee meetings. Correspondence should be addressed to: Secretary, B18 Main Committee, The American Society of Mechanical Engineers, Three Park Avenue, New York, New York 10016-5990.

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes which appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible: citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal including any pertinent documentation.

Interpretations. On request, the B18 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B18 Main Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submits his request in the following format:

- Subject: Cite the applicable paragraph number(s) and a concise description.
- Edition: Cite the applicable edition of the Standard for which the interpretation is being requested.
- Question: Phrase the question as a request for an interpretation of a specific requirementsuitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings which are necessary to explain the question; however, they should not contain proprietary names or information.

Requests which are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information which might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B18 Main Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B18 Main Committee.

CONTENTS

Foreword	iii
Standards Committee Roster	vii
Correspondence with B18 Committee	ix
1 Introductory Notes	1
2 General Data	2
Figure	
1 Optional Types of Cup Points	41
Tables	
1A Dimensions of Hexagon and Spline Socket Head Cap Screws	3
1B Dimensions of Underhead Fillets	7
1C Body and Grip Lengths for Socket Head Cap Screws	8
1D Screws Beyond Sizes in Table 1C	11
1E Shank Straightness for Socket Head Cap Screws	12
1F Dimensions of Drilled Hexagon Socket Head Cap Screws	14
2A Dimensions of Hexagon and Spline Socket Flat Countersunk Head Cap Screws	17
2B Body and Grip Lengths for Socket Flat Countersunk Head Cap Screws	21
2C Screws Beyond Sizes in Table 2B	24
3 Dimensions of Hexagon and Spline Socket Button Head Cap Screws	25
4 Dimensions of Hexagon Socket Head Shoulder Screws	28
5A Dimensions of Hexagon and Spline Socket Set Screws	32
5B Hexagon Key Engagements for Short Length Set Screws	38
5C Dimensions of Optional Cup Points	40
6 Dimensions of Hexagon Sockets	42
7 Dimensions of Spline Sockets	43
8 Dimensions of Hexagon Keys and Bits	45
9 Dimensions of Spline Keys and Bits	47
Mandatory Appendices	
I Gages and Gaging for Hexagon and Spline Sockets	49
II Protrusion Gaging of Flat Countersunk Screws	55
III Straightness Gage and Gaging	57
Nonmandatory Appendices	
A Drill and Counterbore Sizes for Socket Head Cap Screws	59
B Applicability of Keys and Bits to Various Socket Screw Types and Sizes	63
C Formulas for Dimensions	65
D Hexagon and Spline Socket Head Cap Screws (1936 Series)	69

SOCKET CAP, SHOULDER, AND SET SCREWS, HEX AND SPLINE KEYS (INCH SERIES)

1 INTRODUCTORY NOTES

1.1 Scope

1.1.1 This Standard covers complete general and dimensional data for various types of hexagon and spline (fluted) socket cap screws, shoulder screws, set screws, and hexagon and spline keys recognized as American National Standard. Also included are appendices that provide specifications for hexagon and spline socket gages and gaging, tables showing applicability of keys and bits to various socket screws types and sizes, drill and counterbore sizes for socket head cap screws, and formulas on which dimensional data are based. However, where questions arise concerning acceptance of product, the dimensions in the tables shall govern over recalculation by formula.

1.1.2 The inclusion of dimensional data in this Standard is not intended to imply that all of the products described are stock production sizes. Consumers should consult with manufacturers concerning lists of stock production sizes.

1.2 Socket Cap Screws

The head types covered by this Standard include the following.

1.2.1 Socket Head Cap Screws. The socket head shall have flat chamfered top surface with smooth or knurled cylindrical sides and a flat bearing surface. Specifications are given in Tables 1A through 1F. Both hexagon and spline socket types are included.

Dimensions for drilled holes and counterbores are included in Appendix A, Table A1.

1.2.2 Drilled Hexagon Socket Head Cap Screws. Specifications for hexagon socket head cap screws having 2, 4, and 6 holes drilled in the head for lock wire application are given in Table 1F.

1.2.3 Socket Flat Countersunk Head Cap Screws. The flat countersunk head shall have a flat top surface and a conical bearing surface with included

angle of approximately 82 deg. Specifications are given in Tables 2A, 2B, and 2C. Both hexagon and spline socket types are included.

1.2.4 Socket Button Head Cap Screws. The button head shall have a low rounded top surface with a large flat bearing surface. Specifications are given in Table 3. Both hexagon and spline socket types are included.

1.3 Socket Head Shoulder Screws

The socket head shoulder screw is a hexagon socket head screw having a cylindrical shoulder under the head. Specifications are given in Table 4.

1.4 Socket Set Screws

The socket set screw is a screw threaded the entire length and has a point designed to bear on a mating part. The common point styles are cup, flat, oval, cone, and half dog. Specifications for set screws are shown in Tables 5A through 5C for both hexagon and spline socket types.

1.5 Keys and Bits for Driving Socket Screws

The tools for driving socket screws are hexagon or spline keys and bits, the specifications for which appear in Tables 8 and 9, respectively.

1.6 Dimensions

All dimensions in this Standard are given in inches unless stated otherwise.

All dimensions apply prior to plating unless stated otherwise.

1.7 Identification Marking

Products described in paras. 1.2.1 through 1.2.4 and 1.3 with diameters larger than #10 must be marked with the identification of the source manufacturer or private label distributor accepting the responsibility for conformance to this Standard. Marking size, type, and

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

location of marks are at manufacturer's option. Products shall not be marked on bearing surface.

1.8 Options

Options, where specified, shall be at the discretion of the manufacturer unless agreed upon otherwise by the manufacturer and purchaser.

1.9 Responsibility for Modifications

The manufacturer shall not be held responsible for malfunctions of product due to plating or other modifications, when such plating or modification is not accomplished under his control or direction.

1.10 Terminology

For definitions of terms relating to fasteners or to component features thereof used in this Standard, refer to ASME B18.12, Glossary of Terms for Mechanical Fasteners.

1.11 Referenced Standards

Copies of referenced ASTM standards may be obtained from ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103. Copies of referenced ASME and ANSI standards may be obtained from: ASME, Three Park Avenue, New York, New York 10016-5990 and ASME Service Center, 22 Law Drive, Fairfield, New Jersey 07007-2900.

2 GENERAL DATA

2.1 Sockets

In accordance with the provisions set forth in the notes to the respective dimensional tables, screws shall have hexagon or spline sockets as designated by the purchaser.

Gages and gaging procedures are included in Appendix I. For plated products, use GO gages identical in

design and tolerances to those shown in Appendix I, except having minimum dimensions equal to minimum sizes of keys and bits shown in Tables 8 and 9, respectively.

2.1.1 Hexagon Sockets. Hexagon sockets shall conform with the specifications given in Table 6.

2.1.2 Spline Sockets. Spline sockets shall conform with the specifications given in Table 7.

2.2 Threads

Threads on all screw products covered in this Standard shall be in accordance with ASME B1.1, Unified Inch Screw Threads, for the series and class specified in the notes to the respective product dimensional tables.

Acceptability of screw threads shall be based on the specified gaging System 22 in accordance with ASME B1.3M.

2.3 Quality Assurance

Products will be furnished in accordance with ASME B18.18.1M and thread acceptability to Inspection Level C, unless otherwise specified.

2.4 Dimensional Characteristics

Products shall conform to the dimensions indicated in the respective tables. The designated characteristics defined within the notes of each product table shall be inspected in accordance with ASME B18.18.2M. For nondesignated dimensional characteristics the provisions of ASME B18.18.1M shall apply. Should a nondesignated dimension be determined to have a variance, it shall be deemed conforming to this Standard if the user, who is the installer accepts the variance based on fit, form, and function considerations. Where verifiable in-process inspection is used in accordance with ASME B18.18.3M or ASME B18.18.4M, the final inspection level sample sizes of those respective standards shall apply.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

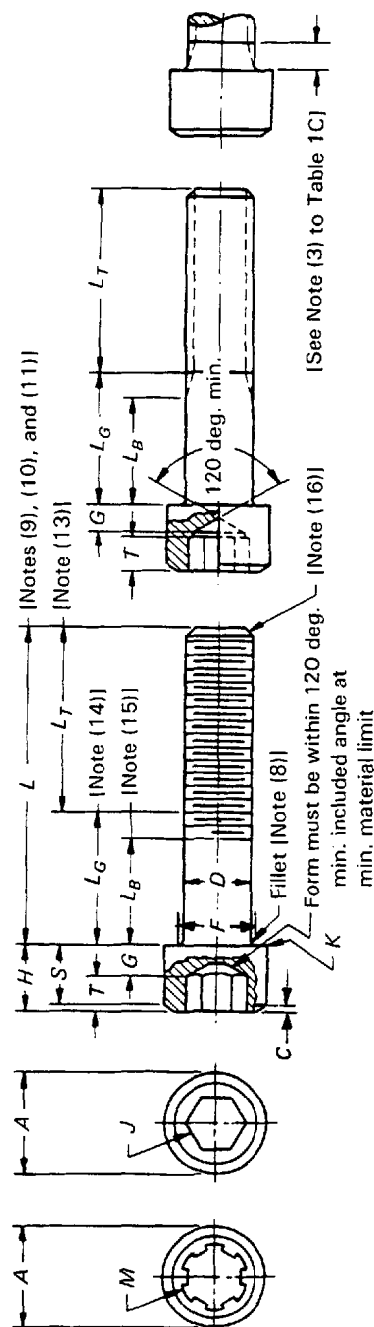


TABLE 1A DIMENSIONS OF HEXAGON AND SPLINE SOCKET HEAD CAP SCREWS

Nominal Size or Basic Screw Diameter	D		A		H		C	M	J	T	G	K
	Body Diameter		Head Diameter		Head Height		Chamfer or Radius	Spine Socket Size	Hexagon Socket Size	Key Engage- ment	Wall Thick- ness	Chamfer or Radius
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Nom.	Nom.	Min.	Min.	Max.
0	0.0600	0.0568	0.096	0.091	0.060	0.057	0.004	0.060	...	0.050	0.025	0.007
1	0.0730	0.0695	0.118	0.112	0.073	0.070	0.005	0.072	1/16	0.062	0.031	0.007
2	0.0860	0.0822	0.140	0.134	0.086	0.083	0.008	0.096	5/64	0.078	0.038	0.007
3	0.0990	0.0949	0.161	0.154	0.099	0.095	0.008	0.096	5/64	0.078	0.044	0.007
4	0.1120	0.1075	0.183	0.176	0.112	0.108	0.009	0.111	3/32	0.094	0.051	0.008
5	0.1250	0.1202	0.205	0.198	0.125	0.121	0.012	0.111	3/32	0.094	0.057	0.008
6	0.1380	0.1329	0.226	0.218	0.138	0.134	0.013	0.133	7/64	0.109	0.064	0.008
8	0.1640	0.1585	0.270	0.262	0.164	0.159	0.014	0.168	9/64	0.141	0.077	0.008
10	0.1900	0.1840	0.312	0.303	0.190	0.185	0.018	0.183	5/32	0.156	0.090	0.008
1/4	0.2500	0.2435	0.375	0.365	0.250	0.244	0.025	0.216	3/16	0.188	0.120	0.010
5/16	0.3125	0.3053	0.469	0.457	0.312	0.306	0.033	0.291	1/4	0.250	0.151	0.010
3/8	0.3750	0.3678	0.562	0.550	0.375	0.368	0.040	0.372	5/16	0.312	0.182	0.010
7/16	0.4375	0.4294	0.656	0.642	0.438	0.430	0.047	0.454	3/8	0.375	0.213	0.015
1/2	0.5000	0.4919	0.750	0.735	0.500	0.492	0.055	0.454	3/8	0.375	0.245	0.015
5/8	0.6250	0.6163	0.938	0.921	0.625	0.616	0.070	0.595	1/2	0.500	0.307	0.015
3/4	0.7500	0.7406	1.125	1.107	0.750	0.740	0.085	0.620	5/8	0.625	0.370	0.015

TABLE 1A DIMENSIONS OF HEXAGON AND SPLINE SOCKET HEAD CAP SCREWS (CONT'D)

Nominal Size or Basic Screw Diameter	D		A		H		C		M		J		T		G		K	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Nom.	Nom.	Min.	Min.	Min.	Min.	Chamfer or Radius	Max.
$\frac{7}{8}$ 0.8750	0.8750	0.8647	1.312	1.293	0.875	0.864	0.100	0.098	0.698	0.750	0.432	0.333	0.020	0.020	0.020	0.020	0.020	0.020
1 1.0000	1.0000	0.9886	1.500	1.479	1.000	0.988	0.114	0.098	0.790	0.750	0.495	0.380	0.020	0.020	0.020	0.020	0.020	0.020
$1\frac{1}{8}$ 1.1250	1.1250	1.1086	1.688	1.665	1.125	1.111	0.129	0.129	...	0.875	0.557	0.428	0.020	0.020	0.020	0.020	0.020	0.020
$1\frac{1}{4}$ 1.2500	1.2500	1.2336	1.875	1.852	1.250	1.236	0.144	0.144	...	0.875	0.620	0.475	0.020	0.020	0.020	0.020	0.020	0.020
$1\frac{3}{8}$ 1.3750	1.3750	1.3568	2.062	2.038	1.375	1.360	0.160	0.160	...	1.000	0.682	0.523	0.020	0.020	0.020	0.020	0.020	0.020
$1\frac{1}{2}$ 1.5000	1.5000	1.4818	2.250	2.224	1.500	1.485	0.176	0.176	...	1.000	0.745	0.570	0.020	0.020	0.020	0.020	0.020	0.020
$1\frac{3}{4}$ 1.7500	1.7500	1.7295	2.625	2.597	1.750	1.734	0.207	0.207	...	1.250	0.870	0.665	0.020	0.020	0.020	0.020	0.020	0.020
2 2.0000	2.0000	1.9780	3.000	2.970	2.000	1.983	0.238	0.238	...	1.500	0.995	0.760	0.020	0.020	0.020	0.020	0.020	0.020
$2\frac{1}{4}$ 2.2500	2.2500	2.2280	3.375	3.344	2.250	2.232	0.269	0.269	...	1.750	1.120	0.855	0.036	0.036	0.036	0.036	0.036	0.036
$2\frac{1}{2}$ 2.5000	2.5000	2.4762	3.750	3.717	2.500	2.481	0.300	0.300	...	1.750	1.245	0.950	0.036	0.036	0.036	0.036	0.036	0.036
$2\frac{3}{4}$ 2.7500	2.7500	2.7262	4.125	4.090	2.750	2.730	0.332	0.332	...	2.000	1.370	1.045	0.036	0.036	0.036	0.036	0.036	0.036
3 3.0000	3.0000	2.9762	4.500	4.464	3.000	3.979	0.363	0.363	...	2.250	1.495	1.140	0.036	0.036	0.036	0.036	0.036	0.036
$3\frac{1}{4}$ 3.2500	3.2500	3.2262	4.875	4.837	3.250	3.228	0.394	0.394	...	2.250	1.620	1.235	0.036	0.036	0.036	0.036	0.036	0.036
$3\frac{1}{2}$ 3.5000	3.5000	3.4762	5.250	5.211	3.500	3.478	0.426	0.426	...	2.750	1.745	1.330	0.036	0.036	0.036	0.036	0.036	0.036
$3\frac{3}{4}$ 3.7500	3.7500	3.7262	5.625	5.584	3.750	3.727	0.458	0.458	...	2.750	1.870	1.425	0.036	0.036	0.036	0.036	0.036	0.036
4 4.0000	4.0000	3.9762	6.000	5.958	4.000	3.976	0.489	0.489	...	3.000	1.995	1.520	0.036	0.036	0.036	0.036	0.036	0.036
See Notes	1	2, 15	3				4	20	21									6

(For additional requirements refer to notes on pages 5 through 7 and General Data on page 2.)

NOTES:

- (1) Nominal Size. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
- (2) Body. The term *body* refers to the unthreaded cylindrical portion of the shank for those screws not threaded to the head.
- (3) Head Diameter. Heads may be plain or knurled at the option of the manufacturer, unless specified otherwise by the customer. For knurled screws, the maximum head diameter shall be measured across the tops of the knurl, and the minimum head diameter shall be the diameter of the unknurled portion or the diameter across the tops of the knurl for those screws not having an unknurled portion, just above the radius or chamfer at the bottom edge of the head.
- (4) Head Chamfer. The top of the head shall be flat. The intersection of the top of the head and the side of the head may be chamfered or radiused within the limits of C, at the manufacturer's option.
- (5) Bearing Surface. The place of the bearing surface shall be perpendicular to the axis of the screw within a maximum deviation of 1 deg.
- (6) Edge of Head. The edge between the bearing surface and the side of the head may be broken (rounded or chamfered), but the radius or chamfer measured along the bearing surface shall not exceed the values listed for K.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

NOTES TO TABLE 1A (CONT'D)

- (7) Concentricity
(a) the head shall be concentric with the shank within 1% of the basic screw diameter, D maximum (2% total runout) or 0.006 in. total runout, whichever is greater, when held within one diameter of the head but beyond the fillet.
(b) the socket shall be concentric with the shank within 1½% of the basic screw diameter, D maximum (3% total runout) or 0.005 in. total runout, whichever is greater, for sizes through ½ in., and 3% (6% total runout) for sizes above ½ in.
(c) the conformance of screws to shank straightness or camber limitations set forth as D_s in Table 1E may be checked by the use of the typical gage illustrated in Appendix III.
- (8) Fillet. For all lengths of screws the form of the underhead fillet shall be optional, as depicted in the illustration above Table 1B, provided it is a smooth and continuous concave curve fairing into the bearing surface of the head, and the screw shank is within the envelope established by the limits for fillet extension, length, and juncture radius specified in Table 1B.
- (9) Length. The length of the screw shall be measured parallel to the axis of the screw from the plane of the bearing surface under the head to the plane of the flat of the point. The portion of the screw contained within dimensions L is commonly called the *shank*. The basic length dimension on the product shall be the nominal length expressed as a two-placed decimal.
- (10) Standard Lengths. Standard length increments for socket head cap screws shall be as tabulated below.

Nominal Screw Size	Nominal Screw Length	Standard Length Increment
0 to 1.00, incl.	0.13 through 0.25	0.06
	0.25 through 1.00	0.13
	1.00 through 3.50	0.25
	3.50 through 7.00	0.50
Over 1.00	7.00 through 10.00	1.00
	1.00 through 7.00	0.50
	7.00 through 10.00	1.00
	Over 10.00	2.00

(11) Length Tolerances. The allowable tolerance on length shall be as tabulated below.

Nominal Screw Size	0 Through ¾, Incl.	7/16 Through ¾, Incl.	7/8 Through 1½, Incl.	Over 1½
Nominal Screw Length	Tolerance on Length			
Up to 1.00, incl.	-0.03	-0.03	-0.05	...
Over 1.00 to 2.50, incl.	-0.04	-0.06	-0.10	-0.18
Over 2.5 to 6.00, incl.	-0.06	-0.08	-0.14	-0.20
Over 6.00	-0.12	-0.12	-0.20	-0.24

NOTES TO TABLE 1A (CONT'D)

- (12) Threads. Threads shall be Unified external threads with radius root: Class 3A UNRC and UNRF Series for screw sizes 0 (0.060 in.) through 1 in.; Class 2A UNRC and UNRF Series for sizes over 1 in. to 1½ in., inclusive; and Class 2A UNRC Series for sizes larger than 1½ in.
For plated or unplated screws, acceptability shall be based upon System 22, ASME B1.3M.
- (13) Thread Length L_T . The length of thread shall be measured, parallel to the axis of the screw, from the extreme point to the last complete (full-form) thread. The thread length on socket head cap screws shall be as defined by Table 1C and notes thereto.
- (14) Grip Gaging Length L_G . Grip gaging length is the distance, measured parallel to the axis of the screw, from the bearing surface of the head to the first complete (full-form) thread under the head (see Table 1C).
- (15) Body Length L_B . Body length is the length, measured parallel to the axis of the screw, of the unthreaded portion of the shank (see Table 1C).
- (16) Screw Point Chamfer. The point shall be flat or slightly concave and chamfered. The plane of the point shall be approximately normal to the axis of the screw. The chamfer shall extend slightly below the root of the thread, and the edge between the flat and chamfer may be slightly rounded. The included angle of the point should be approximately 90 deg. Chamfering of the screw sizes up to and including size 8 (0.164 in.) and lengths below 0.75d shall be optional.
- (17) Material
 - (a) Steel, alloy. Cap screws shall be fabricated from an alloy steel and shall conform in all respects to ASTM A 574, Specification for Alloy Steel Socket Head Cap Screws.
 - (b) Steel, corrosion-resistant. Cap screws shall be fabricated from a corrosion-resistant steel and shall conform in all respects to ASTM F 837, Specification for Stainless Steel Socket Head Cap Screws (Inch).
- (18) Surface Roughness. For alloy steel screws of sizes up to and including ⅝ in., and nominal lengths equal to or less than 8 times the basic screw diameter, the surface roughness of the screws before plating shall not exceed 63 µin. (arithmetic average) on the fillet and head bearing surfaces, nor exceed 32 µin. (arithmetic average) on the threads.
For larger sizes, longer lengths, and corrosion-resistant steel screws, the surface roughness of the screws prior to plating shall not exceed 125 µin. (arithmetic average) on the body [see Note (2)], fillet [see Note (8)], and head bearing surfaces.
Normally, it shall be sufficient to ascertain that these surfaces on screws have the equivalent of a smooth machined finish by visual comparison with known surface standards. However, where it is practical and deemed necessary to measure these surfaces with commercially available equipment, roughness measurements shall be taken axially on the body and fillet surfaces, and circumferentially on the bearing surface. (See ASME B46.1, Surface Texture.)
- (19) Drawings. On socket screw drawings, when the distance from the bearing surface of the head to the threading is dimensioned, regardless of type of thread representation (see ASME Y14.6, Engineering Drawing and Related Documentation Practices, Screw Thread Representation, for description of schematic and simplified thread representation), the dimension should be noted to indicate whether body length or grip length is required.
- (20) See Table 7 for spline socket dimensions and Appendix I for gaging of spline sockets.
- (21) See Table 6 for hexagon socket dimensions and Appendix I for gaging of hexagon sockets.
- (22) Dimensional Conformance. Socket Head Cap Screws shall have the following designated characteristics inspected to ASME B18.18.2M to the inspection levels shown:

Characteristic	Inspection Level
Threads	C
Head Diameter	C
Socket Size (gaged)	C
Length	C
- (23) Designation. Hexagon and Spline Socket Head Cap Screws shall be designated by the following data in the sequence shown: nominal size (number, fractional or decimal equivalent); threads per inch; length (fractional or decimal equivalent); product name; material; and protective coating, if required. See examples below:
6 - 32 x 0.75 Hexagon Socket Head Cap Screw, Alloy Steel
.138 - 32 x 0.75 Spline Socket Head Cap Screws, Alloy Steel, Zinc Plated

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

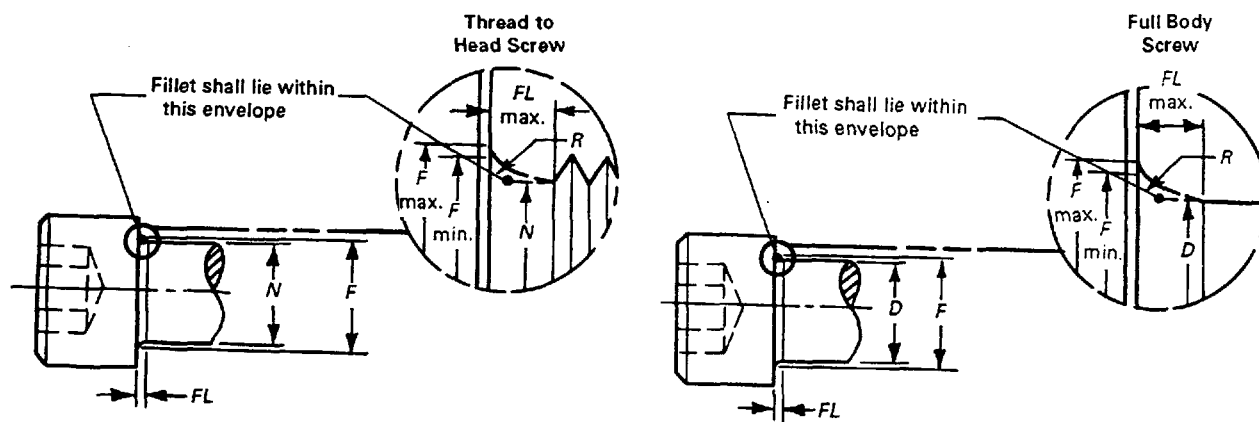


TABLE 1B DIMENSIONS OF UNDERHEAD FILLETS

Nominal Screw Size		F		FL	R	N
		Fillet Transition Diameter		Fillet Length	Juncture Radius	Thread to Head Screw
		Max.	Min.	Max.	Min.	Min.
0	0.0600	0.074	0.063	0.012	0.002	0.051
1	0.0730	0.087	0.076	0.012	0.003	0.061
2	0.0860	0.102	0.090	0.014	0.003	0.073
3	0.0990	0.115	0.103	0.014	0.004	0.084
4	0.1120	0.130	0.118	0.015	0.004	0.094
5	0.1250	0.145	0.132	0.017	0.005	0.107
6	0.1380	0.158	0.145	0.017	0.005	0.116
8	0.1640	0.188	0.173	0.020	0.006	0.142
10	0.1900	0.218	0.202	0.024	0.006	0.160
$\frac{1}{4}$	0.2500	0.278	0.262	0.024	0.007	0.215
$\frac{5}{16}$	0.3125	0.347	0.329	0.029	0.009	0.273
$\frac{3}{8}$	0.3750	0.415	0.398	0.034	0.012	0.331
$\frac{7}{16}$	0.4375	0.484	0.465	0.039	0.014	0.388
$\frac{1}{2}$	0.5000	0.552	0.532	0.044	0.016	0.446
$\frac{5}{8}$	0.6250	0.689	0.664	0.054	0.021	0.562
$\frac{3}{4}$	0.7500	0.828	0.801	0.066	0.025	0.681
$\frac{7}{8}$	0.8750	0.963	0.933	0.075	0.031	0.798
1	1.0000	1.100	1.069	0.085	0.034	0.914
$1\frac{1}{8}$	1.1250	1.235	1.199	0.094	0.039	1.023
$1\frac{1}{4}$	1.2500	1.370	1.334	0.102	0.044	1.148
$1\frac{3}{8}$	1.3750	1.505	1.467	0.110	0.048	1.256
$1\frac{1}{2}$	1.5000	1.640	1.602	0.119	0.052	1.381
$1\frac{3}{4}$	1.7500	1.910	1.870	0.136	0.062	1.609
2	2.0000	2.180	2.128	0.153	0.071	1.843
$2\frac{1}{4}$	2.2500	2.450	2.398	0.170	0.080	2.093
$2\frac{1}{2}$	2.5000	2.720	2.666	0.187	0.088	2.324
$2\frac{3}{4}$	2.7500	2.990	2.936	0.204	0.097	2.574
3	3.0000	3.260	3.206	0.221	0.106	2.824
$3\frac{1}{4}$	3.2500	3.530	3.476	0.238	0.114	3.073
$3\frac{1}{2}$	3.5000	3.800	3.746	0.255	0.124	3.323
$3\frac{3}{4}$	3.7500	4.070	4.016	0.272	0.134	3.573
4	4.0000	4.340	4.286	0.289	0.143	3.823

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 1C BODY AND GRIP LENGTHS FOR SOCKET HEAD CAP SCREWS

Nominal Size	0		1		2		3		4		5		6		8		10	
Nominal Length	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B
0.75	0.25	0.19	0.25	0.17	0.25	0.16	0.25	0.15	0.25	0.12	0.25	0.12	0.50	0.34	0.38	0.22	0.38	0.17
0.88	0.25	0.19	0.25	0.17	0.25	0.16	0.25	0.15	0.25	0.12	0.25	0.12	0.50	0.34	0.38	0.22	0.38	0.17
1.00	0.50	0.44	0.62	0.55	0.62	0.54	0.62	0.52	0.75	0.62	0.75	0.62	1.00	0.84	0.88	0.72	0.88	0.67
1.25	0.75	0.69	0.88	0.80	1.12	1.04	1.12	1.02	1.25	1.12	1.25	1.12	1.50	1.34	1.38	1.22	1.38	1.17
1.50	...	...	...	...	...	...	...	...	1.25	1.12	1.25	1.12	1.50	1.34	1.38	1.22	1.38	1.17
1.75	...	...	...	...	...	...	...	...	1.25	1.12	1.25	1.12	1.50	1.34	1.38	1.22	1.38	1.17
2.00	...	...	...	...	...	...	...	...	...	...	1.75	1.62	2.00	1.84	1.88	1.72	1.88	1.67
2.25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.88	1.72	1.88	1.67
2.50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.88	1.72	1.88	1.67
2.75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.38	2.22	2.38	2.17
3.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.38	2.17
3.25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.67
3.50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.67
3.75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.67
4.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.67

(Table 1C continues on next page.)

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE 1C BODY AND GRIP LENGTHS FOR SOCKET HEAD CAP SCREWS (CONT'D)

Nominal Size	$\frac{1}{4}$		$\frac{5}{16}$		$\frac{3}{8}$		$\frac{7}{16}$		$\frac{1}{2}$		$\frac{5}{8}$		$\frac{3}{4}$		$\frac{7}{8}$		1
Nominal Length	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C
1.50	0.50	0.25															
1.75	0.50	0.25	0.62	0.35	0.50	0.19											
2.00	1.00	0.75	0.62	0.35	0.50	0.19	0.62	0.27									
2.25	1.00	0.75	1.12	0.85	1.00	0.69	0.62	0.27									
2.50	1.50	1.25	1.12	0.85	1.00	0.69	1.12	0.77									
2.75	1.50	1.25	1.62	1.35	1.50	1.19	1.12	0.77									
3.00	2.00	1.75	1.62	1.35	1.50	1.19	1.62	1.27									
3.25	2.00	1.75	2.12	1.85	2.00	1.69	1.62	1.27									
3.50	2.50	2.25	2.12	1.85	2.00	1.69	2.12	1.77									
3.75	2.50	2.25	2.62	2.35	2.50	2.19	2.12	1.77									
4.00	3.00	2.75	2.62	2.35	2.50	2.19	2.62	2.27									
4.25	3.00	2.75	3.12	2.85	3.00	2.69	2.62	2.27									
4.50	3.50	3.25	3.12	2.85	3.00	2.69	3.12	2.77									
4.75	3.50	3.25	3.62	3.35	3.50	3.19	3.12	2.77									
5.00	4.00	3.75	3.62	3.35	3.50	3.19	3.62	3.27									
5.25	...	...	4.12	3.85	4.00	3.69	3.62	3.27									
5.50	...	...	4.12	3.85	4.00	3.69	4.12	3.77									
5.75	...	...	4.62	4.35	4.50	4.19	4.12	3.77									
6.00	...	...	4.62	4.35	4.50	4.19	4.62	4.27									
6.25	...	...	5.12	4.85	5.00	4.69	4.62	4.27									
6.50	...	...	...	...	5.00	4.69	5.12	4.77									
6.75	...	...	...	...	5.50	5.19	5.12	4.77									
7.00	...	...	...	...	5.50	5.19	5.62	5.27									
7.25	...	...	...	...	6.00	5.69	5.62	5.27									
7.50	...	...	...	...	6.00	5.69	6.12	5.77									
7.75	...	...	...	...	...	...	6.12	5.77									
8.00	...	...	...	...	...	...	6.62	6.27									
8.50	...	...	...	...	...	...	7.12	6.77									
9.00	...	...	...	...	...	...	7.62	7.27									
9.50	...	...	...	...	...	...	...	...									
10.00	...	...	...	...	...	...	...	...									

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 1C BODY AND GRIP LENGTHS FOR SOCKET HEAD CAP SCREWS (CONT'D)

Nominal Size	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
Nominal Length	L_C	L_B	L_C	L_B	L_C	L_B	L_C	L_B	L_C
11.00	...	...	...	...	...	9.25	8.80	8.00	7.44
12.00	...	...	...	...	...	10.25	9.80	9.00	8.44
13.00	...	...	...	...	...	...	...	10.00	9.44
14.00	...	...	...	...	...	...	...	11.00	10.44
15.00	...	...	...	...	...	...	...	12.00	11.44
16.00	...	...	...	...	...	...	...	13.00	12.44
17.00	...	...	...	...	...	...	...	14.00	13.44
18.00	...	...	...	...	...	...	...	15.00	14.44
19.00	...	...	...	...	...	...	...	...	16.00
20.00	...	...	...	...	...	...	...	...	17.00

(For additional requirements refer to notes below.)

NOTES:

- (1) The tabulated L_G values are maximum and represent the minimum design grip length of the screw. They shall be measured from the bearing surface of the head to the face of a GO thread ring gage, having the thread countersink and/or counterbore removed, which has been assembled by hand as far as the thread will permit. The tabulated L_B values are minimum and represent the minimum body length of the screw. They are equal to L_G minus 5 times the pitch of the UNRC thread for the respective screw size.
- (2) Screws having nominal lengths falling between those for which L_G and L_B values are tabulated in this Table shall have L_G and L_B dimensions conforming with those of the next shorter tabulated nominal length for the respective screw size. For example: for a 1/4 in. size screw, 1.88 in. long, $L_G = 0.50$ in. and $L_B = 0.25$ in.
- (3) For screws of nominal lengths above the heavy bold line in this Table, the complete (full-form) threads, measured with a thread ring gage having the thread chamfer and/or counterbore removed, shall extend to within two pitches (threads) of the head for sizes 0 (0.060 in.) through 5/8 in., inclusive; and shall extend as close to the head as is practicable for sizes larger than 5/8 in.
- (4) For screws of nominal lengths longer than those for which L_G and L_B values are tabulated in this Table and for screws over 1 in. in diameter, the maximum grip gaging length L_G and the minimum body length L_B of the screws shall be determined as shown in Table 1D:

$$L_G = L - L_T$$

$$L_B = L - L_{TT}$$

where

L = nominal length

L_T = minimum thread length

L_{TT} = maximum total thread length

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

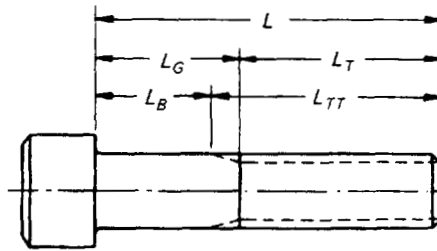


TABLE 1D SCREWS BEYOND SIZES IN
TABLE 1C

Nominal Size or Basic Screw Diameter		L_T	L_{TT}
		Thread Length	Total Thread Length
		Min.	Max.
0	0.0600	0.50	0.62
1	0.0730	0.62	0.77
2	0.0860	0.62	0.80
3	0.0990	0.62	0.83
4	0.1120	0.75	0.99
5	0.1250	0.75	1.00
6	0.1380	0.75	1.05
8	0.1640	0.88	1.19
10	0.1900	0.88	1.27
$\frac{1}{4}$	0.2500	1.00	1.50
$\frac{5}{16}$	0.3125	1.12	1.71
$\frac{3}{8}$	0.3750	1.25	1.94
$\frac{7}{16}$	0.4375	1.38	2.17
$\frac{1}{2}$	0.5000	1.50	2.38
$\frac{5}{8}$	0.6250	1.75	2.82
$\frac{3}{4}$	0.7500	2.00	3.25
$\frac{7}{8}$	0.8750	2.25	3.69
1	1.0000	2.50	4.12
$1\frac{1}{8}$	1.1250	2.81	4.65
$1\frac{1}{4}$	1.2500	3.12	5.09
$1\frac{3}{8}$	1.3750	3.44	5.65
$1\frac{1}{2}$	1.5000	3.75	6.08
$1\frac{3}{4}$	1.7500	4.38	7.13
2	2.0000	5.00	8.11
$2\frac{1}{4}$	2.2500	5.62	8.99
$2\frac{1}{2}$	2.5000	6.25	10.00
$2\frac{3}{4}$	2.7500	6.88	10.87
3	3.0000	7.50	11.75
$3\frac{1}{4}$	3.2500	8.12	12.63
$3\frac{1}{2}$	3.5000	8.75	13.50
$3\frac{3}{4}$	3.7500	9.38	14.37
4	4.0000	10.00	15.25

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 1E SHANK STRAIGHTNESS FOR SOCKET HEAD CAP SCREWS

Nominal Size		0	1	2	3	4	5	6	8	10
Nominal Length		Hole Diameters for Shank D_s [Note (1)]								
Over	To, Incl.									
0	0.25	0.063	0.076	...	...	...	...	...	...	...
0.25	0.50	0.065	0.078	...	...	...	...	...	...	...
0.50	0.75	0.068	0.080	...	...	...	...	...	...	...
0.75	1	0.070	0.082	...	...	...	...	...	...	...
1	1.50	...	0.087	...	...	...	...	...	...	...
0	0.50	...	...	0.090	0.103	0.116	...	...	...	...
0.50	1	...	...	0.095	0.107	0.120	...	...	...	...
1	1.50	...	...	0.099	0.111	0.123	...	...	...	...
1.50	2	...	...	0.103	0.115	0.127	...	...	...	...
2	2.50	...	...	...	...	0.131	...	...	...	...
0	0.75	...	...	...	...	...	0.130	0.143	0.168	...
0.75	1.50	...	...	...	...	...	0.136	0.148	0.173	...
1.50	2.25	...	...	...	...	...	0.140	0.153	0.178	...
2.25	3	...	...	...	...	...	0.146	0.158	0.183	...
3	4	...	...	...	...	...	0.150	0.163	0.189	...
0	1	...	...	...	...	...	...	...	...	0.196
1	2	...	...	...	...	...	...	...	...	0.201
2	3	...	...	...	...	...	...	...	...	0.207
3	4	...	...	...	...	...	...	...	...	0.213
4	6	...	...	...	...	...	...	...	...	0.215

Nominal Size		$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Nominal Length		Hole Diameters for Shank D_s [Note (1)]								
Over	To, Incl.									
0	1	0.255	0.317	0.379	0.441	...	...	...	...	...
1	2	0.260	0.322	0.383	0.445	...	...	...	...	...
2	3	0.265	0.326	0.387	0.449	...	...	...	...	...
3	4	0.270	0.331	0.391	0.453	...	...	...	...	...
4	6	0.275	0.337	0.400	0.462	...	...	...	...	...
0	2	...	...	...	...	0.507	0.631	0.756	0.880	1.005
2	4	...	...	...	...	0.514	0.638	0.762	0.886	1.010
4	6	...	...	...	...	0.521	0.644	0.767	0.891	1.015
6	8	...	...	...	...	0.525	0.650	0.773	0.897	1.020
8	10	...	...	...	...	...	...	0.775	0.900	1.025

(Table 1E continues on next page.)

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE 1E SHANK STRAIGHTNESS FOR SOCKET HEAD CAP SCREWS (CONT'D)

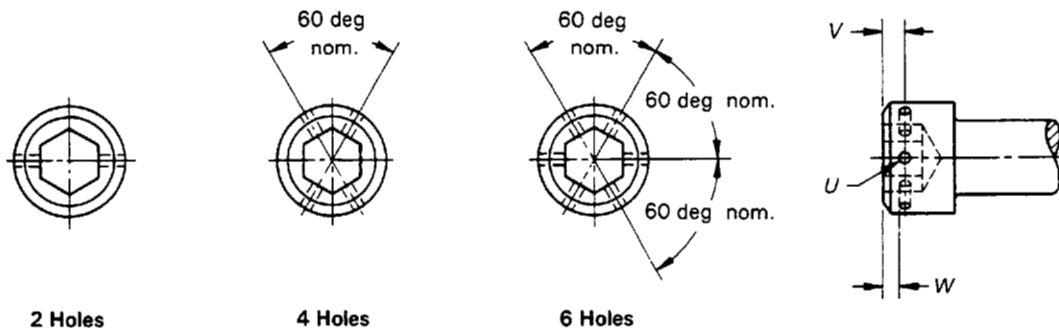
Nominal Size		1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$
Nominal Length		Hole Diameters for Shank D_s [Note (1)]						
Over	To, Incl.							
0	6	1.140	1.265	1.390	1.515	1.765	2.015	2.265
6	12	1.155	1.280	1.405	1.530	1.780	2.030	2.280
12	18	1.170	1.295	1.420	1.545	1.795	2.045	2.295
18	24	1.185	1.310	1.435	1.560	1.810	2.060	2.310

Nominal Size		2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4
Nominal Length		Hole Diameters for Shank D_s [Note (1)]						
Over	To, Incl.							
0	6	2.515	2.765	3.015	3.265	3.515	3.765	4.015
6	12	2.530	2.780	3.030	3.280	3.530	3.780	4.030
12	18	2.545	2.795	3.045	3.295	3.545	3.795	4.045
18	24	2.560	2.810	3.060	3.310	3.560	3.810	4.060

NOTE:

- (1) The largest diameter D_s specified for the various screw sizes shall apply for any nominal screw length longer than that tabulated for the respective nominal screw size.

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 1F DIMENSIONS OF DRILLED HEXAGON SOCKET HEAD CAP SCREWS

Nominal Size or Basic Screw Diameter		U		V		W	Drill Check Plug Diameter		Hole Alignment Check Plug Diameter
		Drilled Hole Diameter		Head to Center of Hole		Head to Edge of Hole	Type I	Type II	
		Number	Basic	Max.	Min.	Min.	Basic	Basic	
4	0.1120	65	0.0350	0.040	0.026	0.008	0.030	0.033	0.025
5	0.1250	65	0.0350	0.045	0.030	0.012	0.030	0.033	0.025
6	0.1380	65	0.0350	0.050	0.035	0.018	0.030	0.033	0.025
8	0.1640	56	0.0465	0.060	0.040	...	0.035	0.044	0.030
10	0.1900	56	0.0465	0.065	0.045	...	0.035	0.044	0.030
1/4	0.2500	56	0.0465	0.085	0.065	...	0.035	0.044	0.030
5/16	0.3125	56	0.0465	0.104	0.084	...	0.035	0.044	0.030
3/8	0.3750	52	0.0635	0.123	0.103	...	0.052	0.061	0.047
7/16	0.4375	52	0.0635	0.141	0.121	...	0.052	0.061	0.047
1/2	0.5000	52	0.0635	0.160	0.140	...	0.052	0.061	0.047
5/8	0.6250	52	0.0635	0.198	0.178	...	0.052	0.061	0.047
3/4	0.7500	42	0.0935	0.235	0.215	...	0.082	0.091	0.077
7/8	0.8750	42	0.0935	0.273	0.253	...	0.082	0.091	0.077
1	1.0000	42	0.0935	0.310	0.290	...	0.082	0.091	0.077
1 1/8	1.1250	31	0.1200	0.348	0.328	...	0.109	0.117	0.104
1 1/4	1.2500	31	0.1200	0.385	0.365	...	0.109	0.117	0.104
1 3/8	1.3750	31	0.1200	0.423	0.403	...	0.109	0.117	0.104
1 1/2	1.5000	31	0.1200	0.460	0.440	...	0.109	0.117	0.104
See Notes	1	3, 4					4		4

(For additional requirements refer to notes on page 15.)

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

NOTES TO TABLE 1F

NOTES:

- (1) Nominal Size. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
- (2) Screws. Drilled hexagon socket head cap screws shall conform to the respective dimensions and requirements set forth in Table 1A and the notes thereto, except for the holes in the head as specified in this Table and the following notes.
- (3) Number of Holes. Screws shall have 2, 4, or 6 holes drilled in the head as designated by the purchaser. For sizes 6 (0.138 in.) and smaller, the use of only 2 holes is recommended.
- (4) Holes. Hole size and location from the top of the head shall conform to the specifications given in this Table. For sizes 8 (0.164 in.) and larger, the drilled hole shall lie within the flats of the hexagon socket and not break through the socket corners. Positioning of holes on opposite sides of the socket shall be such that the hole alignment check plug will pass completely through the head on all screw sizes.

For commercial quality screws, the edge of the holes on the outside of the head may be chamfered or broken. The edge of the holes within the socket may contain burrs to the extent that the socket will accept a key having the standard minimum width across the flats (see Table 8) and the holes must allow the Type I drill check plug to pass from the outside of the head into the socket.

For aircraft quality screws, the edge of the holes on the outside of the head shall be chamfered and there shall be no burr chips or slivers that might become dislodged during usage. The socket shall accept a key having the standard maximum width across the flats (see Table 8) and the hole must allow the Type II drill check plug to pass from the outside of the head into the socket.

Chamfer on the edge of the holes, whether provided optionally or as required, shall be subject to visual inspection only.

- (5) Designation. Drilled Hexagon Socket Head Cap Screws shall be designated by the following data in the sequence shown: nominal size (number, fractional or decimal equivalent); threads per inch; length (fractional or decimal equivalent); product name, including number of holes; material; and protective coating, if required. See examples below:

6 - 32 x 0.75 Drilled (2 Holes) Hexagon Socket Head Cap Screw, Alloy Steel

.375 - 16 x 1.25 Drilled (6 Holes) Hexagon Socket Head Cap Screw, Alloy Steel, Zinc Plated

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

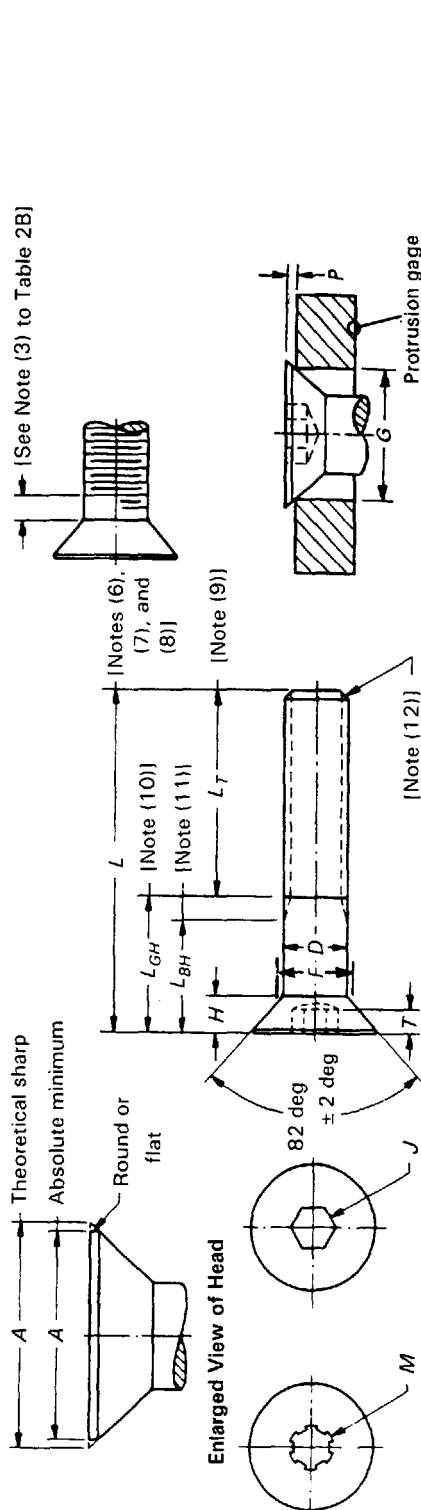


TABLE 2A DIMENSIONS OF HEXAGON AND SPLINE SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS

Nominal Size or Basic Screw Diameter	D		A		H	G		P		M	J	T	F	
	Body Diameter		Head Diameter		Head Height	Protrusion Gage Diameter		Protrusion		Spline Socket Size	Hexagon Socket Size	Key Engage- ment	Fillet Transition Diameter	
	Max.	Min.	Theo. Sharp Max.	Abs. Min.	Refer- ence	Max.	Min.	Max.	Min.		Nominal	Min.	Max.	
0	0.0600	0.0568	0.138	0.117	0.044	0.078	0.077	0.034	0.029	0.048	...	0.035	0.025	0.072
1	0.0730	0.0695	0.168	0.143	0.054	0.101	0.100	0.038	0.032	0.060	...	0.050	0.031	0.089
2	0.0860	0.0822	0.197	0.168	0.064	0.124	0.123	0.042	0.034	0.060	...	0.050	0.038	0.106
3	0.0990	0.0949	0.226	0.193	0.073	0.148	0.147	0.044	0.035	0.072	1/16	0.062	0.044	0.119
4	0.1120	0.1075	0.255	0.218	0.083	0.172	0.171	0.047	0.037	0.072	1/16	0.062	0.055	0.136
5	0.1250	0.1202	0.281	0.240	0.090	0.196	0.195	0.048	0.037	0.096	5/64	0.078	0.061	0.153
6	0.1380	0.1329	0.307	0.263	0.097	0.220	0.219	0.049	0.037	0.096	5/64	0.078	0.066	0.168
8	0.1640	0.1585	0.359	0.311	0.112	0.267	0.266	0.051	0.039	0.111	3/32	0.094	0.076	0.194
10	0.1900	0.1840	0.411	0.359	0.127	0.313	0.312	0.054	0.041	0.145	1/8	0.125	0.087	0.220
1/4	0.2500	0.2435	0.531	0.480	0.161	0.424	0.423	0.059	0.046	0.183	5/32	0.156	0.111	0.280
5/16	0.3125	0.3053	0.656	0.600	0.198	0.539	0.538	0.063	0.050	0.216	3/16	0.188	0.135	0.343
3/8	0.3750	0.3678	0.781	0.720	0.234	0.653	0.652	0.069	0.056	0.251	7/32	0.219	0.159	0.405
7/16	0.4375	0.4294	0.844	0.781	0.234	0.690	0.689	0.084	0.071	0.291	1/4	0.250	0.159	0.468
1/2	0.5000	0.4919	0.938	0.872	0.251	0.739	0.738	0.110	0.096	0.372	5/16	0.312	0.172	0.530
5/8	0.6250	0.6163	1.188	1.112	0.324	0.962	0.961	0.123	0.108	0.454	3/8	0.375	0.220	0.655
3/4	0.7500	0.7406	1.438	1.355	0.396	1.186	1.185	0.136	0.121	0.454	1/2	0.500	0.220	0.780

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 2A DIMENSIONS OF HEXAGON AND SPLINE SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS (CONT'D)

Nominal Size or Basic Screw Diameter	D		A		H		G		P		M		J		T		F	
	Body Diameter		Head Diameter		Head Height		Protrusion Gage Diameter		Protrusion		Spline Socket Size		Hexagon Socket Size		Key Engage- ment		Fillet Transition Diameter	
	Max.	Min.	Theo.	Sharp Max.	Abs. Min.	Refer- ence	Max.	Min.	Max.	Min.	Max.	Min.	Nominal	Max.	Min.	Max.	Max.	Max.
$\frac{7}{8}$	0.8750	0.8647	1.688	1.688	1.604	0.468	1.411	1.410	0.149	0.134	...	...	$\frac{9}{16}$	0.562	0.248	0.905	0.905	0.905
1	1.0000	0.9886	1.938	1.938	1.841	0.540	1.635	1.634	0.162	0.146	...	...	$\frac{5}{8}$	0.625	0.297	1.030	1.030	1.030
$1\frac{1}{8}$	1.1250	1.1086	2.188	2.188	2.079	0.611	1.859	1.858	0.175	0.158	...	...	$\frac{3}{4}$	0.750	0.325	1.187	1.187	1.187
$1\frac{1}{4}$	1.2500	1.2336	2.438	2.438	2.316	0.683	2.083	2.082	0.188	0.169	...	...	$\frac{7}{8}$	0.875	0.358	1.312	1.312	1.312
$1\frac{3}{8}$	1.3750	1.3568	2.688	2.688	2.553	0.755	2.306	2.305	0.202	0.182	...	...	$\frac{7}{8}$	0.875	0.402	1.437	1.437	1.437
$1\frac{1}{2}$	1.5000	1.4818	2.938	2.938	2.791	0.827	2.530	2.529	0.215	0.193	...	...	1	1.000	0.435	1.562	1.562	1.562
See Notes	1	2	3	4	5	5	5	5	5	5	18	18	19	13	13	13	13	13

(For additional requirements refer to notes on pages 18 through 20 and General Data on page 2.)

NOTES:

- (1) Nominal Size. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
- (2) Body. The term *body* refers to the unthreaded cylindrical portion of the shank for those screws not threaded to the head.
- (3) Head Diameter. Maximum sharp values under column A are theoretical values only, as it is not practical to make the edges of the head sharp. The maximum sharp value represents the exact diameter of the hole countersunk to exactly 82 deg, in which a screw having maximum head size will fit flush.
- (4) Head Height. Tabulated values for head height are given for reference only and are calculated to the maximum formulation.
- (5) Protrusion. Suitability of socket flat countersunk head cap screws for application in countersinks designed to the principal dimensions of the screws shall be determined by use of a protrusion gage. The protrusion limits shown shall apply only when the gaging diameter is exactly as indicated with the gaging edge of a sharpness obtained by lapping the hole and the top surface of the gage. The top of the head shall be flat within the limits of the protrusion tolerance. See Appendix II for gaging details.
- (6) Length. The length of the screw shall be measured, parallel to the axis of the screw, from the plane of the top of the head to the plane of the flat of the point. The basic length dimension on the product shall be the nominal length expressed as a two-placed decimal.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

NOTES TO TABLE 2A (CONT'D)

(7) Standard Lengths. Standard length increments for socket flat countersunk head cap screws shall be as tabulated below.

Nominal Screw Size	Nominal Screw Length	Standard Length Increment
0 to 1.00, incl.	0.13 through 0.25 0.25 through 1.00 1.00 through 3.50 3.50 through 7.00 7.00 through 10.00	0.06 0.13 0.25 0.50 1.00
Over 1.00	1.00 through 7.00 7.00 through 10.00 Over 10.00	0.50 1.00 2.00

(8) Length Tolerances. The allowable tolerance on length shall be as tabulated below.

Nominal Screw Size	0 Through $\frac{3}{8}$ Incl.	$\frac{7}{16}$ Through $\frac{3}{4}$ Incl.	$\frac{7}{8}$ Through $1\frac{1}{2}$ Incl.
Nominal Screw Length	Tolerance on Length		
Up to 1.00, incl.	- 0.03	- 0.03	- 0.05
Over 1.00 to 2.50, incl.	- 0.04	- 0.06	- 0.10
Over 2.5 to 6.00, incl.	- 0.06	- 0.08	- 0.14
Over 6.00	- 0.12	- 0.12	- 0.20

(9) Thread Length L_T . The length of the thread shall be measured, parallel to the axis of the screw, from the extreme point to the last complete (full-form) thread. Thread length, on socket flat countersunk head cap screws, shall be as defined by Table 2B and notes thereto.

(10) Grip Gaging Length L_{GH} . Grip gaging length is the distance, measured parallel to the axis of the screw, from the top of the head to the first complete (full-form) thread under the head (see Table 2C).

(11) Body Length L_{BH} . Body length is the length, measured parallel to the axis of the screw, of the unthreaded portion of the shank and the head height (see Table 2C).
(12) Screw Point Chamfer. The point shall be flat or slightly concave and chamfered. The plane of the point shall be approximately normal to the axis of the screw. The chamfer shall extend slightly below the root of the thread, and the edge between the flat and chamfer may be slightly rounded. The included angle of the point should be approximately 90 deg. Chamfering of the screw sizes up to and including size 8 (0.164 in.) and lengths below 1.5d shall be optional.

(13) Fillet. A fillet between the conical bearing surface of the head and the shank (body) of the screw is allowable to the maximum F value (Table 2A).

(14) Bearing Surface. The axis of the conical bearing surface shall be parallel to the axis of the body within $\frac{1}{2}$ deg.

(15) Concentricity. Runout of the thread with the body shall be within 0.005 in./in. of body length (unthreaded portion) full (total) indicator reading, taken directly under the head when the screw is held by the full threads closest to the head of the screw and shall not exceed 0.025 in.

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

NOTES TO TABLE 2A (CONT'D)

- (16) Threads. Threads shall be Unified external threads with radius root: Class 3A UNRC and UNRF Series for sizes 0 (0.060 in.) through 1 in.; Class 2A UNRC and UNRF Series for sizes over 1 in. to 1½ in., inclusive.
Acceptability shall be based on System 22, ASME B1.3M.
Class 3A does not provide a plating allowance. When plated products are required it is recommended that they be procured from the manufacturer (see para. 1.9).
- (17) Material
(a) Steel, alloy. Flat countersunk head cap screws shall be fabricated from an alloy steel and shall conform in all respects to ASTM F 835, Specification for Alloy Steel Button and Flat Countersunk Head Cap Screws (Inch).
(b) Steel, corrosion-resistant. Flat countersunk head cap screws shall be fabricated from austenitic corrosion-resistant steel and shall conform in all respects to ASTM F 879, Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws (Inch).
- (18) See Table 7 for spline socket dimensions and Appendix I for gaging of spline sockets.
- (19) See Table 6 for hexagon socket dimensions and Appendix I for gaging of hexagon sockets.
- (20) Dimensional Conformance. Flat Countersunk Socket Head Cap Screws shall have the following designated characteristics inspected to ASME B18.18.2M to the inspection levels shown:

Characteristic	Inspection Level
Threads	C
Protrusion /Flushness	C
Socket Size (gaged)	C
Length	C

- (21) Designation. Hexagon and Spline Socket Flat Countersunk Head Cap Screws shall be designated by the following data in the sequence shown: nominal size (number, fractional or decimal equivalent); threads per inch; length (fractional or decimal equivalent); product name; material; and protective finish, if required.
See examples below:
.25 - 28 x 1.75 Hexagon Socket Flat Countersunk Head Cap Screw, Alloy Steel
.250 - 28 x 1.75 Hexagon Socket Flat Countersunk Head Cap Screw, Corrosion Resistant Steel
6 - 32 x 0.50 Spline Socket Flat Countersunk Head Cap Screw, Alloy Steel, Zinc Plated

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE 2B BODY AND GRIP LENGTHS FOR SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS

Nominal Size	0		1		2		3		4		5		6		8		10	
Nominal Length	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}	L _{CH}	L _{BH}
0.75	0.25	0.19																
0.88	0.25	0.19	0.25	0.17	0.25	0.16	0.25	0.15										
1.00	0.50	0.44	0.25	0.17	0.25	0.16	0.25	0.15										
1.25	0.75	0.69	0.62	0.55	0.62	0.54	0.62	0.52	0.50	0.38	0.50	0.38	0.50	0.34	0.38	0.22		
1.50	...	...	0.88	0.80	0.88	0.79	0.88	0.77	0.50	0.38	0.50	0.38	0.50	0.34	0.38	0.22	0.62	0.42
1.75	...	...	...	...	1.12	1.04	1.12	1.02	1.00	0.88	1.00	0.88	1.00	0.84	0.88	0.72	0.62	0.42
2.00	...	...	...	...	...	...	...	...	1.00	0.88	1.00	0.88	1.00	0.84	0.88	0.72	1.12	0.92
2.25	...	...	...	...	...	...	...	...	1.50	1.38	1.50	1.38	1.50	1.34	1.38	1.22	1.12	0.92
2.50	...	...	...	...	...	...	...	...	...	...	...	...	1.50	1.34	1.38	1.22	1.62	1.42
2.75	...	...	...	...	...	...	...	...	...	...	...	...	2.00	1.84	1.88	1.72	1.62	1.42
3.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.88	1.72	2.12	1.92
3.25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.38	2.22	2.12	1.92
3.50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.62	2.42
3.75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.62	2.42
4.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.12	2.92

(Table 2B continues on next page.)

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 2B BODY AND GRIP LENGTHS FOR SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS (CONT'D)

Nominal Size	$\frac{1}{4}$		$\frac{5}{16}$		$\frac{3}{8}$		$\frac{7}{16}$		$\frac{1}{2}$		$\frac{5}{8}$		$\frac{3}{4}$		$\frac{7}{8}$		1
Nominal Length	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{BH}
1.75	0.75	0.50															
2.00	0.75	0.50	0.88	0.60													
2.25	1.25	1.00	0.88	0.60	1.00	0.69			1.00	0.62							
2.50	1.25	1.00	1.38	1.10	1.00	0.69	1.12	0.77	1.00	0.62							
2.75	1.75	1.50	1.38	1.10	1.50	1.19	1.12	0.77	1.00	0.62							
3.00	1.75	1.50	1.88	1.60	1.50	1.19	1.62	1.27	1.00	0.62							
3.25	2.25	2.00	1.88	1.60	2.00	1.69	1.62	1.27	1.75	1.36	1.50	1.04					
3.50	2.25	2.00	2.38	2.10	2.00	1.69	2.12	1.77	1.75	1.36	1.50	1.04	1.50	1.00			
3.75	2.75	2.50	2.38	2.10	2.50	2.19	2.12	1.77	1.75	1.36	1.50	1.04	1.50	1.00	1.50	0.94	
4.00	2.75	2.50	2.88	2.60	2.50	2.19	2.62	2.27	2.50	2.12	2.25	1.80	1.50	1.00	1.50	0.94	1.50
4.25	3.25	3.00	2.88	2.60	3.00	2.69	2.62	2.27	2.50	2.12	2.25	1.80	1.50	1.00	1.50	0.94	1.50
4.50	3.25	3.00	3.38	3.10	3.00	2.69	3.12	2.77	2.50	2.12	2.25	1.80	2.50	2.00	1.50	0.94	1.50
4.75	3.75	3.60	3.38	3.10	3.50	3.19	3.12	2.77	3.25	2.86	3.00	2.54	2.50	2.00	2.50	1.94	1.50
5.00	3.75	3.60	3.88	3.60	3.50	3.19	3.62	3.27	3.25	2.86	3.00	2.54	2.50	2.00	2.50	1.94	1.50
5.25	4.25	4.00	3.88	3.60	4.00	3.69	3.62	3.27	3.25	2.86	3.00	2.54	2.50	2.00	2.50	1.94	1.50
5.50	...	...	4.38	4.10	4.00	3.69	4.12	3.77	4.00	3.62	3.75	3.30	3.50	3.00	2.50	1.94	1.50
5.75	...	...	4.38	4.10	4.50	4.19	4.12	3.77	4.00	3.62	3.75	3.30	3.50	3.00	3.50	2.94	2.50
6.00	...	...	4.88	4.60	4.50	4.19	4.62	4.27	4.00	3.62	3.75	3.30	3.50	3.00	3.50	2.94	2.50
6.25	...	...	4.88	4.60	5.00	4.69	4.62	4.27	4.75	4.36	4.50	4.04	3.50	3.00	3.50	2.94	2.50
6.50	...	...	5.38	5.10	5.00	4.69	5.12	4.77	4.75	4.36	4.50	4.04	4.50	4.00	4.50	3.94	3.50
6.75	...	...	...	...	5.50	5.19	5.62	5.27	5.50	5.12	5.25	4.80	4.50	4.00	4.50	3.94	3.50
7.00	...	...	...	...	5.50	5.19	5.62	5.27	5.50	5.12	5.25	4.80	4.50	4.00	4.50	3.94	3.50
7.25	...	...	...	...	6.00	5.69	5.62	5.27	5.50	5.12	5.25	4.80	4.50	4.00	4.50	3.94	3.50
7.50	...	...	...	...	6.00	5.69	6.12	5.77	5.50	5.12	5.25	4.80	5.50	5.00	4.50	3.94	3.50
7.75	...	...	...	...	6.50	6.19	6.12	5.77	6.25	5.86	6.00	5.54	5.50	5.00	5.50	4.94	4.50
8.00	...	...	...	...	...	...	6.62	6.27	6.25	5.86	6.00	5.54	5.50	5.00	5.50	4.94	4.50
8.50	...	...	...	...	...	...	7.12	6.77	7.00	6.62	6.75	6.30	6.50	6.00	6.75	6.19	6.50
9.00	...	...	...	...	...	...	7.62	7.27	7.00	6.62	6.75	6.30	6.50	6.00	6.75	6.19	6.50
9.50	...	...	...	...	...	...	8.12	7.77	8.00	7.62	7.75	7.30	7.50	7.00	7.75	7.19	7.50
10.00	...	...	...	...	...	...	...	...	8.00	7.62	7.75	7.30	7.50	7.00	7.75	7.19	7.50

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE 2B BODY AND GRIP LENGTHS FOR SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS (CONT'D)

Nominal Size	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
Nominal Length	L_{GH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}	L_{BH}	L_{CH}
11.00	...	...	...	...	...	...	9.25	8.80	9.00
12.00	...	...	...	...	...	...	10.25	9.80	10.00
13.00	...	...	...	...	...	...	...	...	11.00
14.00	...	...	...	...	...	...	...	...	12.00
15.00	...	...	...	...	...	...	...	...	13.00
16.00	...	...	...	...	...	...	...	...	...
17.00	...	...	...	...	...	...	...	...	...
18.00	...	...	...	...	...	...	...	...	...
19.00	...	...	...	...	...	...	...	...	...
20.00	...	...	...	...	...	...	...	...	...

(For additional requirements refer to notes below.)

NOTES:

- (1) Tabulated L_{GH} values are maximum and represent the minimum design grip length, including the reference head height, of the screw. They shall be measured from the top of the head to the face of a GO thread ring gage, having the thread countersink and/or counterbore removed, which has been assembled by hand as far as the thread will permit. The tabulated L_{BH} values are minimum and represent the minimum body length, including the reference head height of the screw. They are equal to L_{GH} minus 5 times the pitch of the UNRC thread for the respective screw size.
- (2) Screws having nominal lengths falling between those for which L_{GH} and L_{BH} values are tabulated in this Table shall have L_{GH} and L_{BH} dimensions conforming with those of the next shorter tabulated nominal length for the respective screw size. For example: for a 1/4 in. size screw, 2.13 in. long, $L_{GH} = 0.75$ in. and $L_{BH} = 0.50$ in.
- (3) For screws of nominal lengths above the heavy bold line in this Table, the complete (full-form) threads, measured with a thread ring gage having the thread chamfer and/or counterbore removed, shall extend to within two pitches (threads) of the intersection of the conical portion of the head with the basic screw diameter.
- (4) For screws of nominal lengths longer than those for which L_{GH} and L_{BH} values are tabulated in this Table and for screws over 1 in. in diameter, the maximum grip gaging length L_{GH} and the minimum body length L_{BH} of the screws shall be determined as shown in Table 2C:

$$L_{GH} = L - L_T$$

$$L_{BH} = L - L_{TT}$$

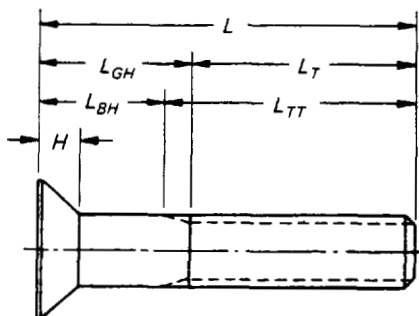
where

L = nominal length

L_T = minimum thread length

L_{TT} = maximum total thread length

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)


**TABLE 2C SCREWS BEYOND SIZES IN
TABLE 2B**

Nominal Size or Basic Screw Diameter		L_T	L_{TT}
		Thread Length	Total Thread Length
		Min.	Max.
0	0.0600	0.50	0.62
1	0.0730	0.62	0.77
2	0.0860	0.62	0.80
3	0.0990	0.62	0.83
4	0.1120	0.75	0.99
5	0.1250	0.75	1.00
6	0.1380	0.75	1.05
8	0.1640	0.88	1.19
10	0.1900	0.88	1.27
$\frac{1}{4}$	0.2500	1.00	1.50
$\frac{5}{16}$	0.3125	1.12	1.71
$\frac{3}{8}$	0.3750	1.25	1.94
$\frac{7}{16}$	0.4375	1.38	2.17
$\frac{1}{2}$	0.5000	1.50	2.38
$\frac{5}{8}$	0.6250	1.75	2.82
$\frac{3}{4}$	0.7500	2.00	3.25
$\frac{7}{8}$	0.8750	2.25	3.69
1	1.0000	2.50	4.12
$1\frac{1}{8}$	1.1250	2.81	4.65
$1\frac{1}{4}$	1.2500	3.12	5.09
$1\frac{3}{8}$	1.3750	3.44	5.65
$1\frac{1}{2}$	1.5000	3.75	6.08

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

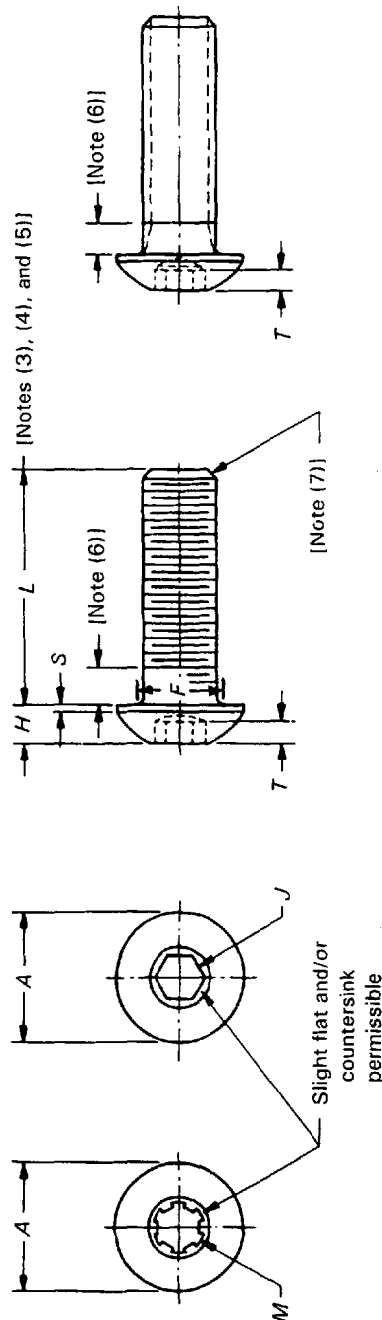


TABLE 3 DIMENSIONS OF HEXAGON AND SPLINE SOCKET BUTTON HEAD CAP SCREWS

Nominal Size or Basic Screw Diameter	A		H		S		M		J		T		F		L	
	Max.	Min.	Max.	Min.	Ref.	Head Side Height	Spline Socket Size	Nom.	Hexagon Socket Size	Nom.	Key Engage- ment	Min.	Max.	Min.	Maximum Standard Length	Nom.
0	.0600	0.114	0.032	0.026	0.010	0.010	0.048	0.035	...	0.035	0.020	0.020	0.080	0.070	0.50	0.50
1	.0730	0.139	0.039	0.033	0.010	0.010	0.060	0.050	...	0.050	0.028	0.028	0.093	0.083	0.50	0.50
2	.0860	0.164	0.046	0.038	0.010	0.010	0.060	0.050	...	0.050	0.028	0.028	0.106	0.096	0.50	0.50
3	.0990	0.188	0.052	0.044	0.010	0.010	0.072	0.062	1/16	0.062	0.035	0.035	0.119	0.109	0.50	0.50
4	.1120	0.213	0.059	0.051	0.015	0.015	0.072	0.062	1/16	0.062	0.035	0.035	0.132	0.122	0.50	0.50
5	.1250	0.238	0.066	0.058	0.015	0.015	0.096	0.078	5/64	0.078	0.044	0.044	0.145	0.135	0.50	0.50
6	.1380	0.262	0.073	0.063	0.015	0.015	0.096	0.078	5/64	0.078	0.044	0.044	0.158	0.148	0.63	0.63
8	.1640	0.312	0.087	0.077	0.015	0.015	0.111	0.094	3/32	0.094	0.052	0.052	0.194	0.184	0.75	0.75
10	.1900	0.361	0.101	0.091	0.020	0.020	0.145	0.125	1/8	0.125	0.070	0.070	0.220	0.210	1.00	1.00
1/4	.2500	0.437	0.132	0.122	0.031	0.031	0.183	0.156	5/32	0.156	0.087	0.087	0.290	0.280	1.00	1.00
5/16	.3125	0.547	0.166	0.152	0.031	0.031	0.216	0.188	3/16	0.188	0.105	0.105	0.353	0.343	1.00	1.00
3/8	.3750	0.656	0.199	0.185	0.031	0.031	0.251	0.219	7/32	0.219	0.122	0.122	0.415	0.405	1.25	1.25
1/2	.5000	0.875	0.265	0.245	0.046	0.046	0.372	0.312	5/16	0.312	0.175	0.175	0.560	0.540	2.00	2.00
5/8	.6250	1.000	0.331	0.311	0.062	0.062	0.454	0.375	3/8	0.375	0.210	0.210	0.685	0.665	2.00	2.00
See Notes	1		2				13		14				8		3, 4, 5, 6	

(For additional requirements refer to notes on pages 26 and 27 and General Data on page 2.)

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

NOTES TO TABLE 3 (CONT'D)

GENERAL NOTE:

This product is designed and recommended for light fastening applications such as guards, hinges, etc. It is not suggested for use in critical high strength applications where socket head cap screws should normally be used.

NOTES:

- (1) Nominal Size. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
- (2) Head Height. Tabulated head heights represent metal-to-metal measurements; that is, the truncation of the rounded surface caused by the socket is not considered part of the head height.
- (3) Length. The length of the screw shall be measured, parallel to the axis of the screw, from the plane of the bearing surface under the head to the plane of the flat of the point. The portion of the screw contained within dimension L is commonly called the *shank*. The basic length dimension on the product shall be the nominal length expressed as a two-place decimal.
- (4) Standard Lengths. Standard length increments for socket button head cap screws shall be as tabulated below.

Nominal Screw Length	Standard Length Increment
0.13 through 0.25	0.06
0.25 through 1.00	0.13
1.00 through 2.00	0.25

- (5) Length Tolerances. Allowable tolerance on length shall be as tabulated below.

Nominal Screw Size	0 Through $\frac{3}{8}$ Incl.	$\frac{1}{2}$ Through $\frac{5}{8}$ Incl.
Nominal Screw Length	Tolerance on Length	
Up to 1.00, incl.	- 0.03	- 0.03
Over 1.00 to 2.00, incl.	- 0.04	- 0.06

- (6) Thread Length. For screws of nominal lengths equal to or shorter than standard maximum lengths L listed in this Table, the complete (full-form) threads, measured with a thread ring gage having the thread chamfer and/or counterbore removed, shall extend to within two pitches (threads) of the bearing surface of the head. For longer screws, the length of the complete thread shall, at the option of the manufacturer, be between the minimum limit of twice the basic screw diameter plus 0.50 in. and the maximum limit within two pitches (threads) of the head. The unthreaded portion of the screw shall be at nominal diameter.
- (7) Screw Point Chamfer. The point shall be flat or slightly concave and chamfered. The plane of the point shall be approximately normal to the axis of the screw. The chamfer shall extend slightly below the root of the thread, and the edge between flat and chamfer may be slightly rounded. The included angle of the point should be approximately 90 deg. Chamfering of screw sizes up to and including size 8 (0.164 in.) and lengths below 0.75d shall be optional.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

NOTES TO TABLE 3 (CONT'D)

- (8) Fillet. The form of the fillet shall be optional provided it flairs into the bearing surface between the minimum and maximum diameter *F*. The fillet shall be a smooth and continuous curve having a bearing surface juncture radius no less than that tabulated below.

Nominal Screw Size	Juncture Radius, Min.	Nominal Screw Size	Juncture Radius, Min.
0	0.002	10	0.006
1	0.003	1/4	0.007
2	0.003	5/16	0.009
3	0.004	3/8	0.012
4	0.004	1/2	0.016
5	0.005	5/8	0.021
6	0.005		
8	0.006		

- (9) Bearing Surface. The plane of the bearing surface shall be perpendicular to the axis of the shank within 2 deg.
- (10) Concentricity. The head shall be concentric to the axis of the shank of the screw within 3% of the maximum head diameter *A* or 0.004 in. (0.008 in. total runout), whichever is greater.
- (11) Threads. Threads shall be Unified external threads with radius root: Class 3A UNRC and UNRF Series. Acceptability shall be based on System 22, ASME B1.3M.
- (12) Material
- (a) Steel, alloy. Button head cap screws shall be fabricated from an alloy steel and shall conform in all respects to ASTM F 835, Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws (Inch).
- (b) Steel, corrosion-resistant. Button head cap screws shall be fabricated from austenitic corrosion-resistant steel and shall conform in all respects to ASTM F 879, Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
- (13) See Table 7 for spline socket dimensions and Appendix I for gaging of spine sockets.
- (14) See Table 6 for hexagon socket dimensions and Appendix I for gaging of hexagon sockets.
- (15) Dimensional Conformance. Socket Button Head Cap Screws shall have the following designated characteristics inspected to ASME B18.18.2M to the inspection levels shown:

Characteristic	Inspection Level
Threads	C
Head Diameter	C
Socket Size (gaged)	C
Length	C

- (16) Designation. Hexagon and Spline Socket Button Head Cap Screws shall be designated by the following data in the sequence shown: nominal size (number, fractional or decimal equivalent); threads per inch; length (fractional or decimal equivalent); product name; material; and protective coating, if required. See examples below:

10 - 32 x 0.75 Hexagon Socket Button Head Cap Screw, Alloy Steel
.190 - 32 x 0.75 Spline Socket Button Head Cap Screw, Alloy Steel, Zinc Plated

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

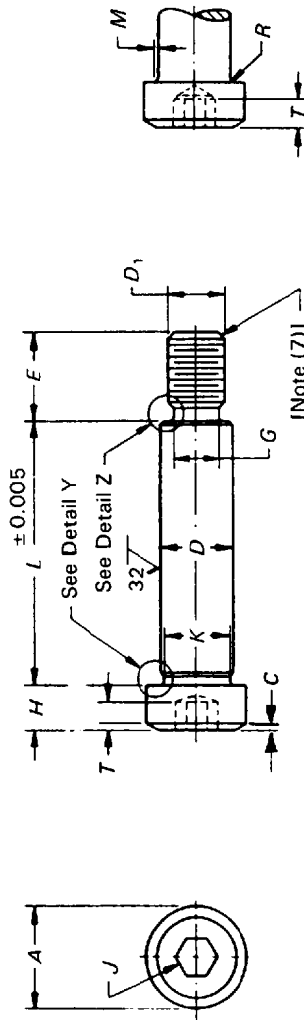
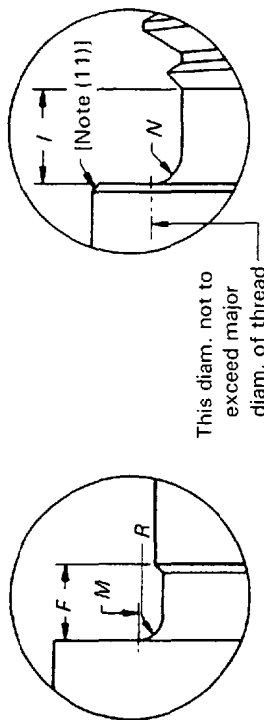


TABLE 4 DIMENSIONS OF HEXAGON SOCKET HEAD SHOULDER SCREWS

Nominal Size (Basic Shoulder) Diameter	D		A		H		C		J		T		M		R	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Nom.	Hexagon Socket Size	Key Engage- ment	Min.	Max.	Fillet Transition Diameter	Head Fillet Radius	Min.
1/4	0.2480	0.2460	0.375	0.357	0.188	0.177	0.020	0.125	1/8	0.094	0.094	0.009	0.276	0.345	0.012	0.009
5/16	0.3105	0.3085	0.438	0.419	0.219	0.209	0.026	0.156	5/32	0.117	0.117	0.012	0.345	0.413	0.015	0.012
3/8	0.3730	0.3710	0.562	0.543	0.250	0.240	0.031	0.188	3/16	0.141	0.141	0.015	0.413	0.550	0.020	0.015
1/2	0.4980	0.4960	0.750	0.729	0.312	0.302	0.040	0.250	1/4	0.188	0.188	0.020	0.550	0.687	0.024	0.020
5/8	0.6230	0.6210	0.875	0.853	0.375	0.365	0.050	0.312	5/16	0.234	0.234	0.024	0.687	0.826	0.030	0.024
3/4	0.7480	0.7460	1.000	0.977	0.500	0.490	0.069	0.375	3/8	0.281	0.281	0.030	0.826	1.098	0.040	0.030
1	0.9980	0.9960	1.312	1.287	0.625	0.610	0.083	0.500	1/2	0.375	0.375	0.040	1.098	1.368	0.050	0.040
1 1/4	1.2480	1.2460	1.750	1.723	0.750	0.735	0.102	0.625	5/8	0.469	0.469	0.050	1.368	1.638	0.060	0.050
1 1/2	1.4980	1.4960	2.125	2.095	1.000	0.980	0.138	0.875	7/8	0.656	0.656	0.060	1.638	1.908	0.070	0.060
1 3/4	1.7480	1.7460	2.375	2.345	1.125	1.105	0.157	1.000	1	0.750	0.750	0.070	1.908	2.178	0.080	0.070
2	1.9980	1.9960	2.750	2.720	1.250	1.230	0.176	1.250	1 1/4	0.937	0.937	0.080	2.178			0.080
See Notes	1		2						15				8			

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998



Enlarged
Detail Y
(See Note (8))

Enlarged
Detail Z
(See Note (10))

TABLE 4 DIMENSIONS OF HEXAGON SOCKET HEAD SHOULDER SCREWS (CONT'D)

Nominal Size or Basic Shoulder Diameter	K		F		D ₁		G		I		N		E	
	Shoulder Neck Diameter	Min.	Shoulder Neck Width	Max.	Nominal Thread Size	Threads, in.	Thread Neck Diameter		Thread Neck Width	Thread Neck Fillet		Thread Length		
							Max.	Min.		Max.	Min.			
1/4	0.250	0.227	0.093	0.093	10	0.1900	0.142	0.133	0.083	0.023	0.017	0.375		
5/16	0.312	0.289	0.093	0.093	1/4	0.2500	0.193	0.182	0.100	0.028	0.022	0.438		
3/8	0.375	0.352	0.093	0.093	5/16	0.3125	0.249	0.237	0.111	0.031	0.025	0.500		
1/2	0.500	0.477	0.093	0.093	3/8	0.3750	0.304	0.291	0.125	0.035	0.029	0.625		
5/8	0.625	0.602	0.093	0.093	1/2	0.5000	0.414	0.397	0.154	0.042	0.036	0.750		
3/4	0.750	0.727	0.093	0.093	5/8	0.6250	0.521	0.502	0.182	0.051	0.045	0.875		
1	1.000	0.977	0.125	0.125	3/4	0.7500	0.638	0.616	0.200	0.055	0.049	1.000		
1 1/4	1.250	1.227	0.125	0.125	7/8	0.8750	0.750	0.726	0.222	0.062	0.056	1.125		
1 1/2	1.500	1.478	0.125	0.125	1 1/8	1.1250	0.964	0.934	0.286	0.072	0.066	1.500		
1 3/4	1.750	1.728	0.125	0.125	1 1/4	1.2500	1.089	1.059	0.286	0.072	0.066	1.750		
2	2.000	1.978	0.125	0.125	1 1/2	1.5000	1.307	1.277	0.333	0.102	0.096	2.000		
See Notes		8	8	8	13		10	10	10		10			

(For additional requirements refer to notes on pages 30 and 31 and General Data on page 2.)

NOTES TO TABLE 4

NOTES:

- (1) Shoulder. Shoulder refers to the enlarged unthreaded portion of the screw, the diameter of which serves as the basis for derivation of the nominal size.
- (2) Head Diameter. The head may be plain or knurled at the option of the manufacturer.
- (3) Head Chamfer. The top of the head shall be flat. The intersection of the top of the head and the side of the head may be chamfered or radiused within the limits of C , at the manufacturer's option.
- (4) Length. The length of the screw shall be measured, parallel to the axis of the screw, from the plane of the bearing surface under the head to the plane of the shoulder at the threaded end. The basic length dimension on the product shall be the nominal length expressed as a three-placed decimal.
- (5) Standard Lengths. The difference between consecutive lengths of standard screws shall be as designated in the following tabulation.

Nominal Screw Length	Standard Length Increment
0.25 through 0.75	0.13
0.75 through 5.00	0.25
Over 5.00	0.50

- (6) Thread Length Tolerance. Tolerance on thread length E shall be -0.020 in. for screw sizes up to $\frac{3}{8}$ in., inclusive, and -0.030 in. for screw sizes larger than $\frac{3}{8}$ in.
 - (7) Screw Point Chamfer. The point shall be flat or slightly concave, and chamfered. The plane of the point shall be approximately normal to the axis of the screw. The chamfer shall extend slightly below the root of the thread, and the edge between flat and chamfer may be slightly rounded. The included angle of the point should be approximately 90 deg.
 - (8) Neck and Fillet Under Head. Screws may be necked under the head at the option of the manufacturer. The fillet extension above D , at the intersection of the head bearing surface and neck or shoulder, shall be controlled by maximum dimension M and minimum radius of curvature R .
 - (9) Bearing Surface. The plane of the bearing surface of the head shall be perpendicular to the axis of the shoulder within a maximum deviation of 2 deg.
 - (10) Neck Under Shoulder. The neck under the shoulder shall allow the shoulder to seat against the face of a standard basic GO thread ring gage.
 - (11) Edge of Shoulder. The edge of the shoulder may be broken. The radius or chamfer shall not exceed 0.005 in. for shoulders to 0.373 in. diameter and 0.008 in. for larger diameters.
 - (12) Concentricity. Head shall be concentric with the shoulder within 1% (2% total runout) of the nominal diameter D or 0.003 in. (0.006 in. total runout), whichever is greater.
Pitch diameter and shoulder shall be concentric within 0.004 in. total runout when checked at a distance of 0.188 in. from the shoulder at the threaded end.
Concentricity, parallelism, bow, and squareness of shoulder to thread shall be within 0.005 in. total runout per inch of shoulder length, with a maximum of 0.025 in., when firmly seated against the shoulder in a threaded bushing, and checked on the shoulder a distance of $2F$ from the underside of the head. Threads of bushing shall be basic size, and bushing O.D. and ends shall be concentric and square with the axis.
 - (13) Threads. Threads shall be Unified external thread: Class 3A, UNC Series.
Acceptability is to be based on System 2Z, ASME B1.3M.
Class 3A does not provide a plating allowance. When plated products are required, it is recommended that they be procured from the manufacturer (see para. 1.9).
 - (14) Material. Shoulder screws shall be fabricated from an alloy steel having one or more of the following alloying elements: chromium, nickel, molybdenum, or vanadium, in sufficient quantity to assure that the specified hardness range of 32–43 HRC at the surface is met when hardened by quenching from the austenitizing temperature and tempered at not lower than 343°C (650°F). Decarburization and carburization limits shall be the same as those specified for socket head cap screws in ASTM A 574, Specification for Alloy Steel Socket Head Cap Screws.
- Shoulder screws shall meet the following mechanical property requirements; the hardness shall be 32–43 HRC anywhere in the section.
- There are no other specific mechanical tests called out, but for design considerations, these shoulder screws should develop the following:
- (a) 140,000 psi minimum tensile strength based on the minimum thread neck area;
 - (b) 84,000 psi minimum shear strength in the thread neck area, based on the minimum thread neck area;
 - (c) 84,000 psi minimum shear strength in the shoulder, based on the minimum shoulder area.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

NOTES TO TABLE 4 (CONT'D)

- (15) See Table 6 for hexagon socket dimensions and Appendix I for gaging of hexagon sockets.
- (16) Dimensional Conformance. Socket Head Shoulder Screws shall have the following designated characteristics inspected to ASME B18.18.2M to the inspection levels shown:
- | Characteristic | Inspection Level |
|-------------------|------------------|
| Threads | C |
| Shoulder Diameter | C |
| Shoulder Length | C |
- (17) Designation. Hexagon Socket Head Shoulder Screws shall be designated by the following data in the sequence shown: nominal size or basic shoulder diameter (fractional or decimal equivalent); shoulder length (fractional or decimal equivalent); product name; material; and protective coating, if required. See examples below:
- .250 x 1.250 Hexagon Socket Head Shoulder Screw, Alloy Steel
- .250 x 1.250 Hexagon Socket Head Shoulder Screw, Alloy Steel, Phosphate Coated

ASME B18.3-1998

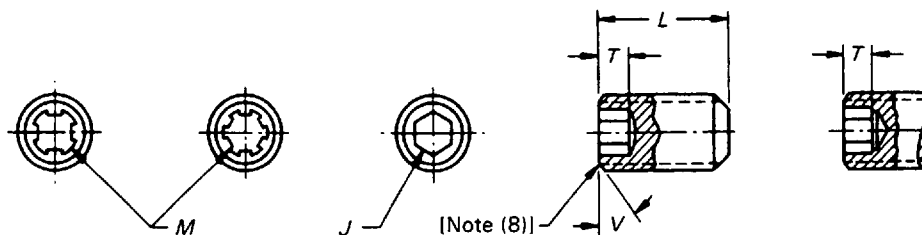
SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 5A DIMENSIONS OF HEXAGON AND SPLINE SOCKET SET SCREWS

		<i>J</i>		<i>M</i>		<i>T</i>		<i>C</i>		<i>R</i>	<i>Y</i>
						Min. Key Engagement to Develop Functional Capability of Key		Cup and Flat Point Diameters		Oval Point Radius	Cone Point Angle 90 deg $\pm$ 2 deg for These Nominal Lengths or Longer: 118 $\pm$ 2 deg for Shorter Nominal Lengths
Nominal Size or Basic Screw Diameter	Hexagon Socket Size	No. of Splines and Spline Socket Size				Hex Socket, T_H Min.	Spline Socket, T_S Min.	Max.	Min.	Basic	
0	0.0600	...	0.028	4	.033	0.050	0.026	0.033	0.027	0.045	0.09
1	0.0730	...	0.035	4	0.033	0.060	0.035	0.040	0.033	0.055	0.09
* 2	0.0860	...	0.035	4 and 6	0.048	0.060	0.040	0.047	0.039	0.064	0.13
3	0.0990	...	0.050	4 and 6	0.048	0.070	0.040	0.054	0.045	0.074	0.13
4	0.1120	...	0.050	6	0.060	0.070	0.045	0.061	0.051	0.084	0.19
* 5	0.1250	$\frac{1}{16}$	0.062	4	0.069	0.080	0.055	0.067	0.057	0.094	0.19
5	0.1250	$\frac{1}{16}$	0.062	6	0.072	0.080	0.055	0.067	0.057	0.094	0.19
6	0.1380	$\frac{1}{16}$	0.062	6	0.072	0.080	0.055	0.074	0.064	0.104	0.19
* 6	0.1380	$\frac{1}{16}$	0.062	4	0.076	0.080	0.055	0.074	0.064	0.104	0.19
8	0.1640	$\frac{5}{64}$	0.078	6	0.096	0.090	0.080	0.087	0.076	0.123	0.25
10	0.1900	$\frac{3}{32}$	0.094	6	0.111	0.100	0.080	0.102	0.088	0.142	0.25
$\frac{1}{4}$	0.2500	$\frac{1}{8}$	0.125	6	0.145	0.125	0.125	0.132	0.118	0.188	0.31
$\frac{5}{16}$	0.3125	$\frac{5}{32}$	0.156	6	0.183	0.156	0.156	0.172	0.156	0.234	0.38
$\frac{3}{8}$	0.3750	$\frac{3}{16}$	0.188	6	0.216	0.188	0.188	0.212	0.194	0.281	0.44
$\frac{7}{16}$	0.4375	$\frac{7}{32}$	0.219	6	0.251	0.219	0.219	0.252	0.232	0.328	0.50
$\frac{1}{2}$	0.5000	$\frac{1}{4}$	0.250	6	0.291	0.250	0.250	0.291	0.270	0.375	0.57
$\frac{5}{8}$	0.6250	$\frac{5}{16}$	0.312	6	0.372	0.312	0.312	0.371	0.347	0.469	0.75
$\frac{3}{4}$	0.7500	$\frac{3}{8}$	0.375	6	0.454	0.375	0.375	0.450	0.425	0.562	0.88
$\frac{7}{8}$	0.8750	$\frac{1}{2}$	0.500	6	0.595	0.500	0.500	0.530	0.502	0.656	1.00
1	1.0000	$\frac{9}{16}$	0.562	...	...	0.562	...	0.609	0.579	0.750	1.13
$1\frac{1}{8}$	1.1250	$\frac{9}{16}$	0.562	...	...	0.562	...	0.689	0.655	0.844	1.25
$1\frac{1}{4}$	1.2500	$\frac{5}{8}$	0.625	...	...	0.625	...	0.767	0.733	0.938	1.50
$1\frac{3}{8}$	1.3750	$\frac{5}{8}$	0.625	...	...	0.625	...	0.848	0.808	1.031	1.63

* Where both six and four splines are available, six splines will be supplied unless four splines are ordered.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

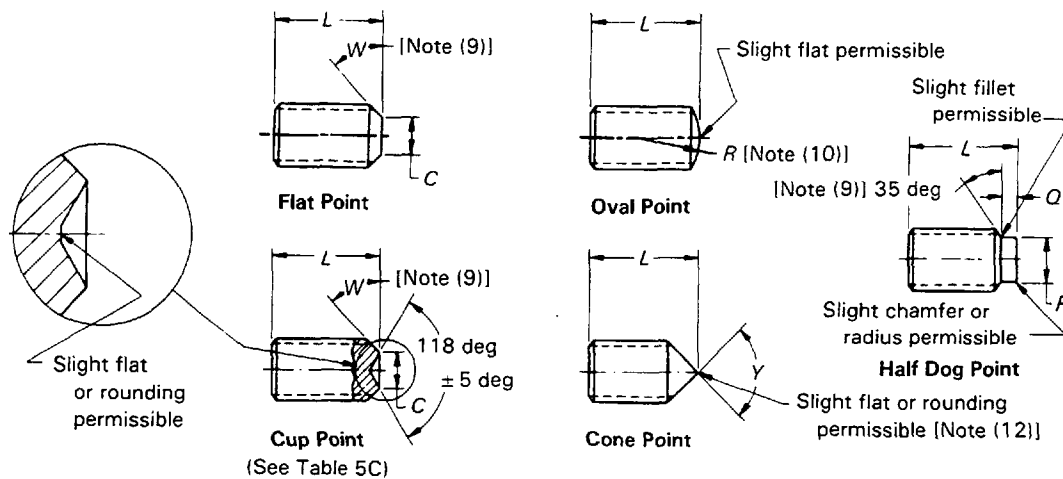


TABLE 5A DIMENSIONS OF HEXAGON AND SPLINE SOCKET SET SCREWS

<i>P</i>		<i>Q</i>		<i>B</i>			<i>B</i> ₁		
Half Dog Point				Shortest Optimum Nominal Length to Which <i>T</i> _H Applies			Shortest Optimum Nominal Length to Which <i>T</i> _S Applies		
Diameter		Length		Cup and Flat Points	90 deg Cone and Oval Points	Half Dog Point	Cup and Flat Points	90 deg Cone and Oval Points	Half Dog Point
Max.	Min.	Max.	Min.						
0.040	0.037	0.017	0.013	0.13	0.13	0.13	0.06	0.13	0.13
0.049	0.045	0.021	0.017	0.13	0.19	0.13	0.13	0.19	0.13
0.057	0.053	0.024	0.020	0.13	0.19	0.19	0.13	0.19	0.19
0.066	0.062	0.027	0.023	0.19	0.19	0.19	0.13	0.19	0.19
0.075	0.070	0.030	0.026	0.19	0.19	0.19	0.13	0.19	0.19
0.083	0.078	0.033	0.027	0.19	0.19	0.19	0.13	0.19	0.19
0.083	0.078	0.033	0.027	0.19	0.19	0.19	0.13	0.19	0.19
0.092	0.087	0.038	0.032	0.19	0.25	0.19	0.13	0.25	0.19
0.092	0.087	0.038	0.032	0.19	0.25	0.19	0.13	0.25	0.19
0.109	0.103	0.043	0.037	0.19	0.25	0.25	0.19	0.25	0.25
0.127	0.120	0.049	0.041	0.19	0.25	0.25	0.19	0.25	0.25
0.156	0.149	0.067	0.059	0.25	0.31	0.31	0.25	0.31	0.31
0.203	0.195	0.082	0.074	0.31	0.44	0.38	0.31	0.44	0.38
0.250	0.241	0.099	0.089	0.38	0.44	0.44	0.38	0.44	0.44
0.297	0.287	0.114	0.104	0.44	0.63	0.50	0.44	0.63	0.50
0.344	0.334	0.130	0.120	0.50	0.63	0.63	0.50	0.63	0.63
0.469	0.456	0.164	0.148	0.63	0.88	0.88	0.63	0.88	0.88
0.562	0.549	0.196	0.180	0.75	1.00	1.00	0.75	1.00	1.00
0.656	0.642	0.227	0.211	0.88	1.00	1.00	0.88	1.25	1.00
0.750	0.734	0.260	0.240	1.00	1.25	1.25	...	...	...
0.844	0.826	0.291	0.271	1.25	1.50	1.25	...	...	...
0.938	0.920	0.323	0.303	1.25	1.50	1.50	...	...	...
1.031	1.011	0.354	0.334	1.50	1.75	1.50	...	...	...

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)**TABLE 5A DIMENSIONS OF HEXAGON AND SPLINE SOCKET SET SCREWS (CONT'D)**

		<i>J</i>		<i>M</i>	<i>T</i>		<i>C</i>		<i>R</i>	<i>Y</i>
					Min. Key Engagement to Develop Functional Capability of Key		Cup and Flat Point Diameters		Oval Point Radius	Cone Point Angle 90 deg $\pm$ 2 deg for These Nominal Lengths or Longer: 118 $\pm$ 2 deg for Shorter Nominal Lengths
Nominal Size or Basic Screw Diameter		Hexagon Socket Size		No. of Splines and Spline Socket Size	Hex Socket, T_H Min.	Spline Socket, T_S Min.			Basic	
		Nom.					Max.	Min.		
1½	1.5000	¾	0.750	...	0.750	...	0.926	0.886	1.125	1.75
1¾	1.7500	1	1.000	...	1.000	...	1.086	1.039	1.312	2.00
2	2.000	1	1.000	...	1.000	...	1.244	1.193	1.500	2.25
See Notes	1	14		13		7		9	10	9

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE 5A DIMENSIONS OF HEXAGON AND SPLINE SOCKET SET SCREWS (CONT'D)

<i>P</i>		<i>Q</i>		<i>B</i>			<i>B</i> ₁		
Half Dog Point				Shortest Optimum Nominal Length to Which <i>T_H</i> Applies			Shortest Optimum Nominal Length to Which <i>T_S</i> Applies		
Diameter		Length		Cup and Flat Points	90 deg Cone and Oval Points	Half Dog Point	Cup and Flat Points	90 deg Cone and Oval Points	Half Dog Point
Max.	Min.	Max.	Min.						
1.125	1.105	0.385	0.365	1.50	2.00	1.75	...	...	...
1.312	1.289	0.448	0.428	1.75	2.25	2.00	...	...	...
1.500	1.474	0.510	0.490	2.00	2.50	2.50	...	...	...
9, 11				7, 8, 9					

(For additional requirements refer to notes on pages 36 and 37 and General Data on page 2.)

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)**NOTES TO TABLE 5A****NOTES:**

- (1) Nominal Size. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
- (2) Length. The length of the screw shall be measured overall, parallel to the axis of the screw. The basic length dimension on the product shall be the nominal length expressed as a two-place decimal.
- (3) Standard Lengths. Standard length increments for set screws shall be as tabulated below.

Nominal Screw Length	Standard Length Increment
0.13 through 0.19 [Note (1)]	0.03
0.13 through 0.50	0.06
0.50 through 1.00	0.13
1.00 through 2.00	0.25
2.00 through 6.00	0.50
Over 6.00	1.00

NOTE:

- (1) Applicable only to sizes 0 (0.060 in.) through 3 (0.099 in.), inclusive.

- (4) Tolerance on Length. Tolerance on length of set screws shall be as tabulated below.

Nominal Screw Length	Tolerance on Length
Up to 0.63, incl.	±0.01
Over 0.63 to 2.00, incl.	±0.02
Over 2.00 to 6.00, incl.	±0.03
Over 6.00	±0.06

- (5) Threads. Threads shall be Unified external thread: Class 3A, UNC and UNF Series.

As standard gages provide only for engagement lengths up to $1\frac{1}{2}$ diameters, changes in pitch diameter of either or both external and internal thread may be required for longer lengths of engagement.

Acceptability shall be based on System 22, ASME B1.3M when the following conditions are applicable:

- (a) Minimum major diameter is .132 or greater.

- (b) When threaded length equals seven thread pitches, including lead threads on both ends or greater.

Thread acceptability for all other set screws shall be based on System 21, ASME B1.3M. Class 3A does not provide a plating allowance. When plated products are required, it is recommended that they be procured from the manufacturer (see para. 1.9).

- (6) Material

- (a) Steel, alloy. Socket set screws shall be fabricated from alloy steel and shall conform in all respects to ASTM F 912, Specification for Alloy Steel Socket Set Screws (Inch).

- (b) Steel, corrosion-resistant. Socket set screws shall be fabricated from austenitic corrosion-resistant steel and shall conform in all respects to ASTM F 880, Specification for Stainless Steel Socket Set Screws.

- (7) Socket Depths. The key engagement dimensions given in columns T_H and T_S of this Table shall apply only to nominal screw lengths equal to or longer than the lengths listed in this Table, columns B and B_1 , respectively. For hexagon socket key engagement dimensions in screws of shorter nominal lengths than those listed in column B of this Table and Table 5B. Spline sockets in screws shorter than those listed in column B_1 of this Table shall be as deep as practicable.

- (8) Face. The plane of the face on the socket end of the screw shall be approximately normal to the axis of the screw, and shall be chamfered on screws longer than lengths listed in this Table, columns B and B_1 . The chamfer angle V shall be between 30 deg and 45 deg. The chamfer shall extend slightly below the root diameter of the thread and the edge between flat and chamfer may be slightly rounded. For screws equal to or shorter than the lengths listed in columns B and B_1 , or screws .250 inch diameter or greater, with a national coarse thread, including lengths longer than listed in column B and B_1 , chamfering shall be at the option of the manufacturer. If chamfered, the chamfer angle V shall not exceed 45 deg.

- (9) Point Angles. Point angles specified shall apply only to those portions of the angles that lie below the root diameter of the thread. The angles may vary in the threaded portions due to manufacturing processes.

W shall be 45 deg, +5 deg -0 deg, for screws of lengths equal to or longer than the lengths listed in this Table, columns B and B_1 , and 30 deg minimum for shorter screws.

- (10) Oval Point Radius Tolerance. The tolerance shall be +0.015 in. for screw nominal sizes through 5 (0.125 in.) and +0.031 in. for screw nominal sizes 6 (0.138 in.) and larger.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

NOTES TO TABLE 5A (CONT'D)

- (11) Half Dog Point Eccentricity. The permissible eccentricity of the half dog axis, with respect to the axis of the thread, shall not exceed 3% of the basic diameter of the screw, and in no case shall be greater than 0.005 in. for sizes up to and including $\frac{3}{4}$ in. For sizes over $\frac{3}{4}$ in., it shall not be greater than 0.010 in. (Total runout shall not exceed twice the permissible eccentricity.)
- (12) Cone Point Configuration. The apex of the cone may be flatted or rounded to the extent of 10% of the basic diameter of the screw.
- (13) Spline Sockets. See Table 7 for spline socket dimensions and Appendix I for gaging of spline sockets.
- (14) Hexagon Sockets. See Table 6 for hexagon socket dimensions and Appendix I for gaging of hexagon sockets.
- (15) Dimensional Conformance. Socket Set Screws shall have the following designated characteristics inspected to ASME B18.18.2M to the inspection levels shown:

Characteristic	Inspection Level
Threads	C
Min. Key Engagement	C
Socket Size (gaged)	C
Length	C

- (16) Designation. Hexagon and Spline Socket Set Screws shall be designated by the following data in the sequence shown: nominal size (number, fractional or decimal equivalent); threads per inch; length (fractional or equivalent); product name; point style; material; and protective coating, if required. See examples below:
- .25 - 20 × 0.25 Hexagon Socket Set Screw, Cup Point, Alloy Steel, Zinc Plated
- .112 - 40 × 0.12 Spline Socket Set Screw, Flat Point, Alloy Steel
- 6 - 32 × 0.25 Hexagon Socket Set Screw, Cup Point, Corrosion-Resistant Steel

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)**TABLE 5B HEXAGON KEY ENGAGEMENTS FOR SHORT LENGTH SET SCREWS**

Nominal Size or Basic Screw Diameter		<i>J</i>		<i>L</i>	<i>T_H</i>		
		Hexagon Socket Size		Nominal Screw Lengths	Minimum Key Engagement		
		Nom.			Cup [Note (1)] and Flat Points	118 deg Cone and Oval Points	Half Dog Point
0	0.0600	...	0.028	0.06 0.09	0.030 0.040	0.028 0.040 [Note (2)]	... [Note (3)] 0.028
1	0.0730	...	0.035	0.06 0.09	0.030 0.040	0.029 0.040 [Note (2)]	... [Note (3)] 0.040
2	0.0860	...	0.035	0.06 0.09	0.030 0.040	0.029 0.040	... [Note (3)] 0.035
3	0.0990	...	0.050	0.09 0.13	0.040 0.055	0.039 0.040 [Note (2)]	... [Note (3)] 0.045
4	0.1120	...	0.050	0.09 0.13	0.045 0.060	0.039 0.045	... [Note (3)] 0.045
5	0.1250	1/16	0.062	0.09 0.13	0.040 0.060	0.039 0.045	... [Note (3)] 0.045
6	0.1380	1/16	0.062	0.09 0.13 0.16	0.040 0.060 0.070	0.039 0.045 0.065	... [Note (3)] 0.045 0.065
8	0.1640	5/64	0.078	0.13 0.16 0.19	0.060 0.070 ... [Note (4)]	0.050 0.060 0.065	0.045 0.060 0.065
10	0.1900	3/32	0.094	0.13 0.19	0.060 ... [Note (4)]	0.042 0.060	0.042 0.060
1/4	0.2500	1/8	0.125	0.19 0.25	0.090 ... [Note (4)]	0.065 0.110	0.055 0.090
5/16	0.3125	5/32	0.156	0.25 0.31	0.125 ... [Note (4)]	0.099 0.140	0.090 0.105
3/8	0.3750	3/16	0.188	0.25 0.31 0.38	0.110 0.140 ... [Note (4)]	0.090 0.115 0.165	0.075 0.105 0.155
7/16	0.4375	7/32	0.219	0.38 0.44	0.160 ... [Note (4)]	0.125 0.160	0.125 0.160
1/2	0.5000	1/4	0.250	0.38 0.44 0.50	0.175 0.215 ... [Note (4)]	0.130 0.155 0.195	0.130 0.155 0.195
5/8	0.6250	5/16	0.312	0.50	0.205	0.145	0.145

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE 5B HEXAGON KEY ENGAGEMENTS FOR SHORT LENGTH SET SCREWS (CONT'D)

Nominal Size or Basic Screw Diameter		<i>J</i>		<i>L</i>	<i>T_H</i>		
		Hexagon Socket Size		Nominal Screw Lengths	Minimum Key Engagement		
		Nom.			Cup [Note (1)] and Flat Points	118 deg Cone and Oval Points	Half Dog Point
$\frac{3}{4}$	0.7500	$\frac{3}{8}$	0.375	0.63	0.255	0.190	0.190
				0.75	... [Note (4)]	0.325	0.295
$\frac{7}{8}$	0.8750	$\frac{1}{2}$	0.500	0.75	0.330	0.255	0.255
				0.87	... [Note (4)]	0.419	0.330
1	1.0000	$\frac{9}{16}$	0.562	0.75	0.280	0.175	0.175
				0.87	0.380	0.280	0.280
				1.00	... [Note (4)]	0.380	0.380

GENERAL NOTES:

- (a) **CAUTION:** The use of short length set screws listed in this Table can result in failure of the socket, key, or mating threads during tightening because key engagement and thread length are less than optimum. Therefore, it is strongly recommended that screws of lengths equal to or greater than the lengths specified in columns *B* and *B₁* of Table 5A be used wherever possible.
- (b) See Table 5A, and the illustrations and notes thereto, for additional dimensions and specifications.

NOTES:

- (1) Cup angle may be 118 deg or 130 deg, +5 deg, depending upon screw length and manufacturing process.
- (2) Cone point angle for these lengths shall be 90 deg; see column *Y* in Table 5A.
- (3) These sizes are impractical to manufacture because of point configuration and short length.
- (4) These screws are covered in Table 5A.

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 5C DIMENSIONS OF OPTIONAL CUP POINTS

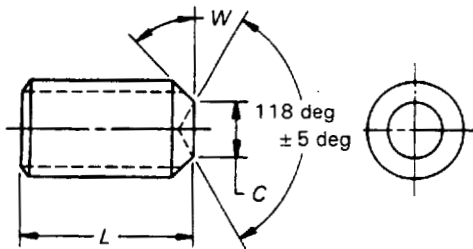
Nominal Size or Basic Screw Diameter		C_1		C_2		S	
		Point Diameter		Point Diameter		Point Length	
		Max.	Min.	Max.	Min.	Max.	Min.
0	0.0600	0.032	0.027	0.027	0.022	0.007	0.004
1	0.0730	0.038	0.033	0.035	0.030	0.008	0.005
2	0.0860	0.043	0.038	0.043	0.038	0.010	0.007
3	0.0990	0.050	0.045	0.051	0.046	0.011	0.007
4	0.1120	0.056	0.051	0.059	0.054	0.013	0.008
5	0.1250	0.062	0.056	0.068	0.063	0.014	0.009
6	0.1380	0.069	0.062	0.074	0.068	0.017	0.012
8	0.1640	0.082	0.074	0.090	0.084	0.021	0.016
10	0.1900	0.095	0.086	0.101	0.095	0.024	0.019
$\frac{1}{4}$	0.2500	0.125	0.114	0.156	0.150	0.027	0.022
$\frac{5}{16}$	0.3125	0.156	0.144	0.190	0.185	0.038	0.033
$\frac{3}{8}$	0.3750	0.187	0.174	0.241	0.236	0.041	0.036
$\frac{7}{16}$	0.4375	0.218	0.204	0.286	0.281	0.047	0.042
$\frac{1}{2}$	0.5000	0.250	0.235	0.333	0.328	0.054	0.049
$\frac{5}{8}$	0.6250	0.312	0.295	0.425	0.420	0.067	0.062
$\frac{3}{4}$	0.7500	0.375	0.357	0.523	0.518	0.081	0.076
$\frac{7}{8}$	0.8750	0.437	0.418	...	...	...	...
1	1.0000	0.500	0.480	...	...	...	...
$1\frac{1}{8}$	1.1250	0.562	0.542	...	...	...	...
$1\frac{1}{4}$	1.2500	0.625	0.605	...	...	...	...
$1\frac{3}{8}$	1.3750	0.687	0.667	...	...	...	...
$1\frac{1}{2}$	1.5000	0.750	0.730	...	...	...	...
$1\frac{3}{4}$	1.7500	0.875	0.855	...	...	...	...
2	2.0000	1.000	0.980	...	...	...	...

GENERAL NOTES:

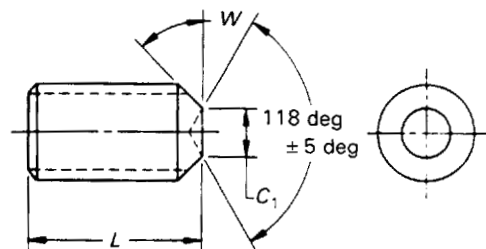
- (a) Type A point shown in Fig. 1 is the cup point dimensioned in Table 5A. Types B, C, D, E, F, and G are typical variations of the cup point which are supplied by some manufacturers.
- (b) For dimensions not shown above, refer to Table 5A.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

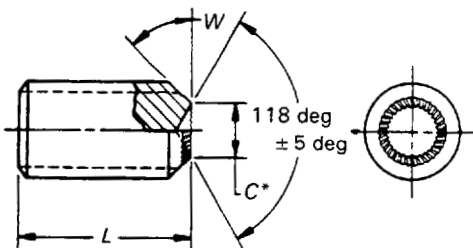
ASME B18.3-1998



Type A

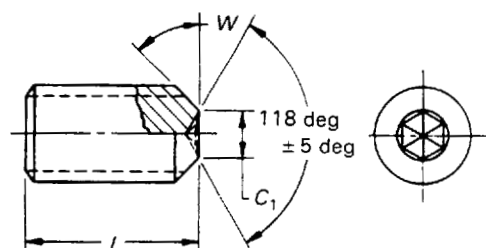


Type B

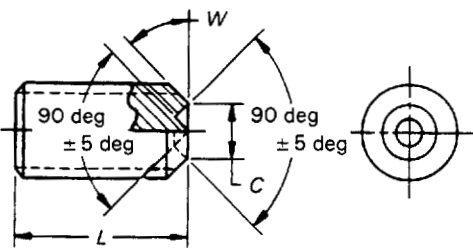


Type C

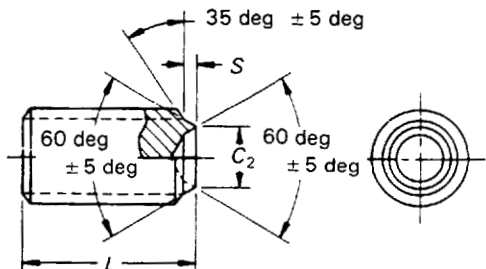
*This diameter may be counterbored.



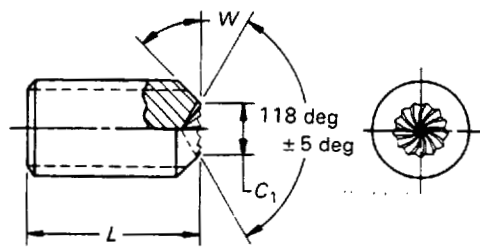
Type D



Type E



Type F



Type G

FIG. 1 OPTIONAL TYPES OF CUP POINTS

ASME B18.3-1998

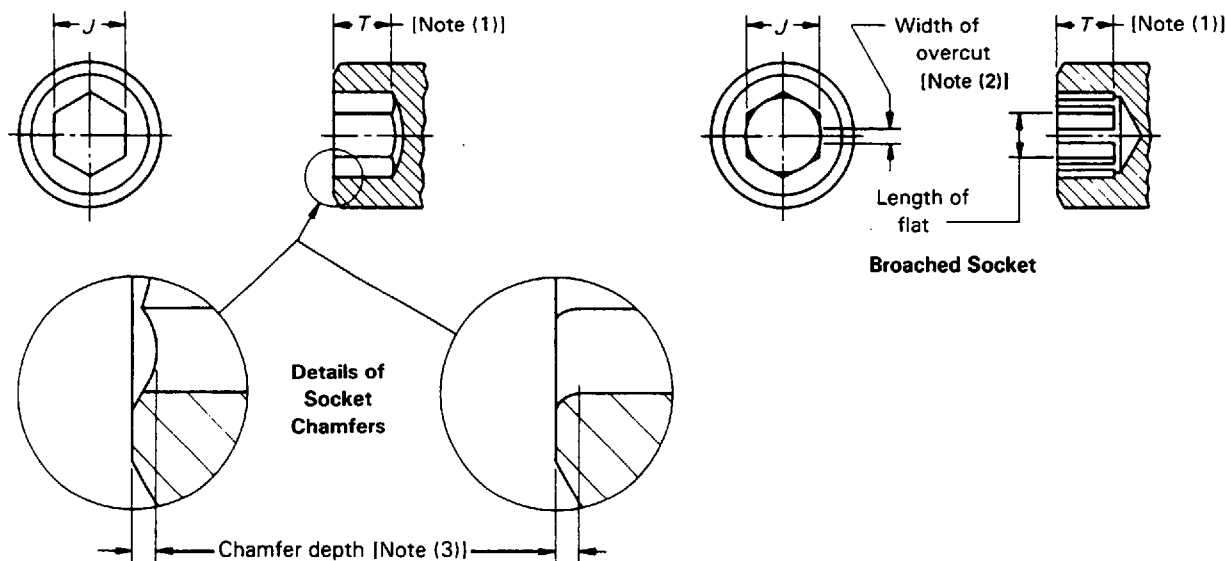
SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)


TABLE 6 DIMENSIONS OF HEXAGON SOCKETS

Nominal Socket Size		<i>J</i>		Nominal Socket Size		<i>J</i>		Nominal Socket Size		<i>J</i>	
		Socket Width Across Flats				Socket Width Across Flats				Socket Width Across Flats	
		Max.	Min.			Max.	Min.			Max.	Min.
...	0.028	0.0285	0.0280	$\frac{3}{16}$	0.188	0.1900	0.1875	$\frac{7}{8}$	0.875	0.8850	0.8750
...	0.035	0.0355	0.0350	$\frac{7}{32}$	0.219	0.2217	0.2187	1	1.000	1.0200	1.0000
...	0.050	0.0510	0.0500	$\frac{1}{4}$	0.250	0.2530	0.2500	$1\frac{1}{4}$	1.250	1.2750	1.2500
$\frac{1}{16}$	0.062	0.0635	0.0625	$\frac{5}{16}$	0.312	0.3160	0.3125	$1\frac{1}{2}$	1.500	1.5300	1.5000
$\frac{5}{64}$	0.078	0.0791	0.0781	$\frac{3}{8}$	0.375	0.3790	0.3750	$1\frac{3}{4}$	1.750	1.7850	1.7500
$\frac{3}{32}$	0.094	0.0952	0.0937	$\frac{7}{16}$	0.438	0.4420	0.4375	2	2.000	2.0400	2.0000
$\frac{7}{64}$	0.109	0.1111	0.1094	$\frac{1}{2}$	0.500	0.5050	0.5000	$2\frac{1}{4}$	2.250	2.2950	2.2500
$\frac{1}{8}$	0.125	0.1270	0.1250	$\frac{9}{16}$	0.562	0.5680	0.5625	$2\frac{3}{4}$	2.750	2.8050	2.7500
$\frac{9}{64}$	0.141	0.1426	0.1406	$\frac{5}{8}$	0.625	0.6310	0.6250	3	3.000	3.0600	3.0000
$\frac{5}{32}$	0.156	0.1587	0.1562	$\frac{3}{4}$	0.750	0.7570	0.7500	...	...	...	...

(For additional requirements refer to notes below and General Data on page 2.)

GENERAL NOTES:

- Sockets up to and including 1 in. nominal size shall be checked in accordance with the hexagon socket gages and gaging specified in Appendix I. Suitability of larger sockets shall be determined by means of direct measurement for various technical and economic reasons.
- Dimensions of sockets apply before plating. When plated, see para. 2.1 for gaging.

NOTES:

- Applicable socket depths are specified in the dimensional tables and notes for the respective screw types.
- For broached sockets, the maximum acceptable undercut shall be a size causing an average 20% flat length reduction in the maximum dimension across flat hexagon for socket sizes up to and including 1 in., and 30% for larger sockets. The maximum undercut on any one of the six flats shall not exceed a 40% reduction in flat length for any size socket.
- Where hexagon sockets are chamfered, the depth of chamfer shall not exceed 10% of the nominal socket size for sizes up to and including $\frac{1}{16}$ in., and 7.5% for larger sizes. For chamfered sockets, it is permissible for the NOT GO socket gage to enter to the depth of chamfer as specified in Appendix I.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

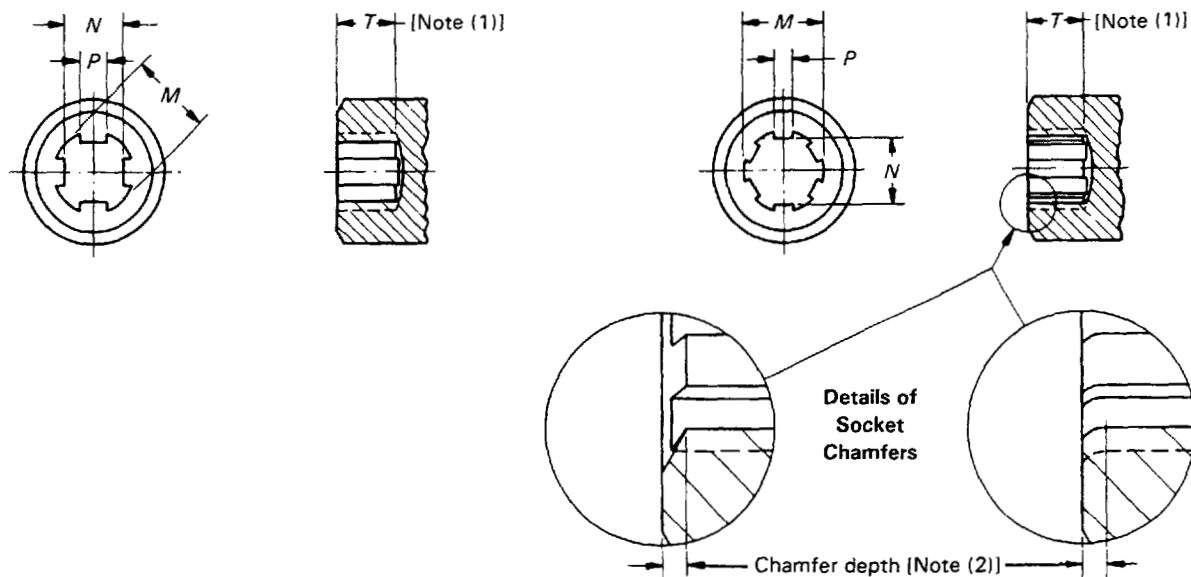


TABLE 7 DIMENSIONS OF SPLINE SOCKETS

Nominal Socket and Key Size	Number of Teeth	<i>M</i>		<i>N</i>		<i>P</i>	
		Socket Major Diameter		Socket Minor Diameter		Width of Tool	
		Max.	Min.	Max.	Min.	Max.	Min.
0.033	4	0.035	0.034	0.0275	0.0260	0.0120	0.0115
0.048 [Note (3)]	4	0.050	0.049	0.0395	0.038	0.017	0.016
0.048	6	0.050	0.049	0.041	0.040	0.011	0.010
0.060	6	0.062	0.061	0.051	0.050	0.014	0.013
0.069 [Note (3)]	4	0.071	0.070	0.0545	0.053	0.021	0.020
0.072	6	0.074	0.073	0.064	0.063	0.016	0.015
0.076 [Note (3)]	4	0.079	0.078	0.0575	0.056	0.023	0.022
0.096	6	0.098	0.097	0.082	0.080	0.022	0.021
0.111	6	0.115	0.113	0.098	0.096	0.025	0.023
0.133	6	0.137	0.135	0.118	0.116	0.030	0.028
0.145	6	0.149	0.147	0.128	0.126	0.032	0.030
0.168	6	0.173	0.171	0.150	0.147	0.036	0.033
0.183	6	0.188	0.186	0.163	0.161	0.039	0.037
0.216	6	0.221	0.219	0.190	0.188	0.050	0.048
0.251	6	0.256	0.254	0.221	0.219	0.060	0.058
0.291	6	0.298	0.296	0.254	0.252	0.068	0.066
0.372	6	0.380	0.377	0.319	0.316	0.092	0.089
0.454	6	0.463	0.460	0.386	0.383	0.112	0.109
0.595	6	0.604	0.601	0.509	0.506	0.138	0.134
0.620	6	0.631	0.627	0.535	0.531	0.149	0.145
0.698	6	0.709	0.705	0.604	0.600	0.168	0.164
0.790	6	0.801	0.797	0.685	0.681	0.189	0.185

(Notes follow on page 44.)

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)**NOTES TO TABLE 7**

GENERAL NOTE: Refer to General Data on page 2.

NOTES:

- (1) Applicable socket depths are specified in the dimensional tables and notes for the respective screw types.
- (2) Where spline sockets are chamfered, the depth of chamfer shall not exceed 10% of the nominal socket size for sizes up to and including 0.060 in., and 7.5% for larger sizes. For chamfered sockets, it is permissible for the NOT GO socket gage to enter to the depth of chamfered as specified in Appendix I.
- (3) Where both six and four splines are available, six splines will be supplied unless 4 splines are ordered.

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

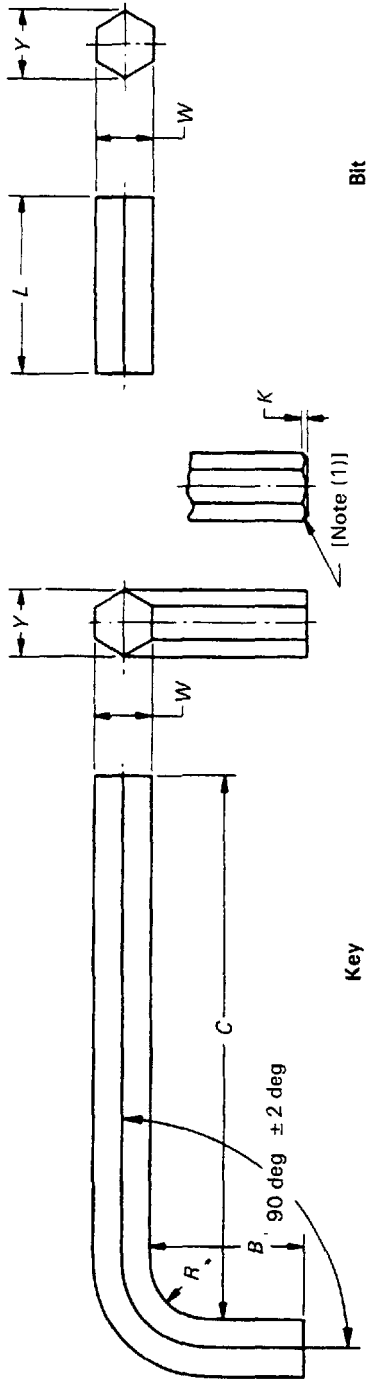


TABLE 8 DIMENSIONS OF HEXAGON KEYS AND BITS

Nominal Key or Bit and Socket Size	W		Y		B		C		R		L		K	
	Hexagon Width Across Flats		Hexagon Width Across Corners		Length of Short Arm		Length of Long Arm		Radius of Bend		Length of Bit		Chamfer	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
...	0.028	0.0280	0.0275	0.0314	0.0300	0.312	0.125	1.312	1.125	0.062	2.500	0.062	0.003	0.003
...	0.035	0.0350	0.0345	0.0393	0.0378	0.438	0.250	1.312	1.125	0.062	2.578	0.062	0.004	0.004
...	0.050	0.0500	0.0490	0.0560	0.0540	0.625	0.438	1.750	1.562	0.062	2.750	0.062	0.006	0.006
1/16	0.062	0.0625	0.0615	0.0701	0.0680	0.656	0.469	1.844	1.656	0.062	2.906	0.062	0.008	0.008
5/64	0.078	0.0781	0.0771	0.0880	0.0859	0.703	0.516	1.969	1.781	0.078	3.094	0.078	0.008	0.008
3/32	0.094	0.0937	0.0927	0.1058	0.1035	0.750	0.562	2.094	1.906	0.094	3.281	0.094	0.009	0.009
7/64	0.109	0.1094	0.1079	0.1238	0.1210	0.797	0.609	2.219	2.031	0.109	3.469	0.109	0.014	0.014
1/8	0.125	0.1250	0.1235	0.1418	0.1390	0.844	0.656	2.344	2.156	0.125	3.656	0.125	0.015	0.015
9/64	0.141	0.1406	0.1391	0.1593	0.1566	0.891	0.703	2.469	2.281	0.141	3.844	0.141	0.016	0.016
5/32	0.156	0.1562	0.1547	0.1774	0.1745	0.938	0.750	2.594	2.406	0.156	4.031	0.156	0.016	0.016
3/16	0.188	0.1875	0.1860	0.2135	0.2105	1.031	0.844	2.844	2.656	0.188	4.406	0.188	0.022	0.022
7/32	0.219	0.2187	0.2172	0.2490	0.2460	1.125	0.938	3.094	2.906	0.219	4.781	0.219	0.024	0.024
1/4	0.250	0.2500	0.2485	0.2845	0.2815	1.219	1.031	3.344	3.156	0.250	5.156	0.250	0.030	0.030
5/16	0.312	0.3125	0.3110	0.3570	0.3531	1.344	1.156	3.844	3.656	0.312	5.906	0.312	0.032	0.032
3/8	0.375	0.3750	0.3735	0.4285	0.4238	1.469	1.281	4.344	4.156	0.375	6.656	0.375	0.044	0.044
7/16	0.438	0.4375	0.4355	0.5005	0.4944	1.594	1.406	4.844	4.656	0.438	7.406	0.438	0.047	0.047

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 8 DIMENSIONS OF HEXAGON KEYS AND BITS (CONT'D)

Nominal Key or Bit and Socket Size	W		Y		B		C				R	L	K
	Hexagon Width Across Flats		Hexagon Width Across Corners		Length of Short Arm		Length of Long Arm				Radius of Bend	Length of Bit	Chamfer
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	±0.062	Max.	
1/2	0.500	0.4975	0.5715	0.5650	1.719	1.531	5.344	5.156	8.344	8.156	0.500	...	0.050
9/16	0.562	0.5600	0.6420	0.6356	1.844	1.656	5.844	5.656	9.094	8.906	0.562	...	0.053
5/8	0.625	0.6225	0.7146	0.7080	1.969	1.781	6.344	6.156	9.844	9.656	0.625	...	0.055
3/4	0.750	0.7470	0.8580	0.8512	2.219	2.031	7.344	7.156	11.344	11.156	0.750	...	0.070
7/8	0.875	0.8720	1.0020	0.9931	2.469	2.281	8.344	8.156	12.844	12.656	0.875	...	0.076
1	1.000	0.9970	1.1470	1.1350	2.719	2.531	9.344	9.156	14.344	14.156	1.000	...	0.081
1 1/4	1.250	1.2430	...	...	3.250	2.750	11.500	11.000	...	...	1.250	3.750	0.092
1 1/2	1.500	1.4930	...	...	3.750	3.250	13.500	13.000	...	...	1.500	4.500	0.104
1 3/4	1.750	1.7430	...	...	4.250	3.750	15.500	15.000	...	...	1.750	5.250	0.115
2	2.000	1.9930	...	...	4.750	4.250	17.500	17.000	...	...	2.000	6.000	0.126
2 1/4	2.250	2.2430	...	...	5.250	4.750	19.500	19.000	...	...	2.250	6.750	0.137
2 3/4	2.750	2.7420	...	...	6.250	5.750	23.500	23.000	...	...	2.750	8.250	0.159
3	3.000	2.9920	...	...	6.750	6.250	25.500	25.000	...	...	3.000	9.000	0.171
See Notes			2									4	1

(For additional requirements refer to notes below.)

NOTES:

- (1) Each end shall be square with the axis of each arm with 4 deg and edges may be sharp or chamfered at the option of the manufacturer. The chamfer shall not exceed the values listed.
- (2) Any truncation or rounding of hexagon corners within the specified across-corner dimensions shall be evident on all corners.
- (3) Material (Steel Alloy). Hexagon keys and bits shall be fabricated from an alloy steel having two or more of the following alloying elements: chromium, nickel, molybdenum, or vanadium, in sufficient quantity to assure that the specified minimum hardness of 48 HRC at the surface for sizes up to and including 3/8 in., and 45 HRC for sizes over 3/8 in., is met when hexagon keys and bits are hardened by quenching from the austenitizing temperature and tempered.
- (4) For nominal socket sizes above 1 in., it is recommended that bits be used in conjunction with standard hexagon wrenches or power drives. When the application makes the use of keys necessary, the keys should conform to the dimensions listed. Bits 1 in. and smaller are available, but the lengths have not been standardized.
- (5) For plated hexagon keys and bits, all dimensions are before plating.
- (6) For applicability of keys and bits to various socket screw types and sizes, see Appendix B.
- (7) Designation. Hexagon Keys or Bits shall be designated by the following data in the sequence shown: nominal key (or bit) size (fractional or decimal equivalent); product name; series; and protective coating, if required. See examples below:
 - .125 Hexagon Key, Short Series
 - .125 Hexagon Key, Long Series, Nickel Plated
 - 1.500 Hexagon Bit

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

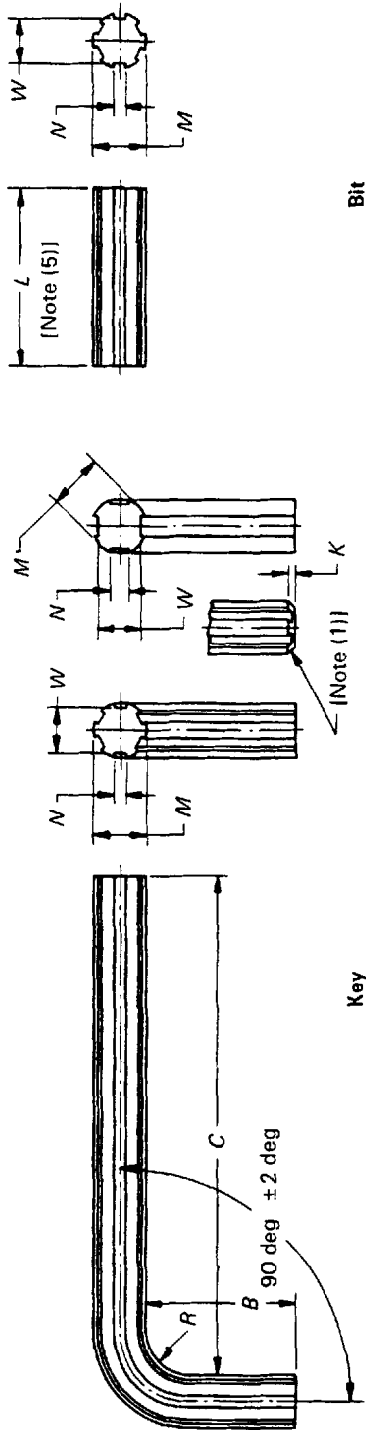


TABLE 9 DIMENSIONS OF SPLINE KEYS AND BITS

Nominal Key and Socket Size	M		W		Number of Spline	N		B		C				R		K
	Major Diameter		Minor Diameter			Width of Space		Length of Short Arm		Length of Long Arm				Radius of Bend		
	Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.	Short Series		Long Series		Min.	Max.	
										Max.	Min.	Max.	Min.			
0.033	0.0330	0.0320	0.0250	0.0240	4	0.0140	0.0130	0.312	0.125	1.312	1.125	...	...	0.062	0.003	
0.048	0.0480	0.0470	0.0370	0.0360	4	0.0190	0.0180	0.438	0.250	1.312	1.125	...	...	0.062	0.004	
0.048	0.0480	0.0470	0.0390	0.0380	6	0.0130	0.0120	0.438	0.250	1.312	1.125	...	...	0.062	0.004	
0.060	0.0600	0.0590	0.0490	0.0480	6	0.0160	0.0150	0.625	0.438	1.750	1.562	...	...	0.062	0.006	
0.069	0.0690	0.0680	0.0510	0.0500	4	0.0260	0.0250	0.656	0.469	1.844	1.656	...	...	0.062	0.007	
0.072	0.0720	0.0710	0.0620	0.0610	6	0.0190	0.0180	0.656	0.469	1.844	1.656	...	...	0.062	0.008	
0.076	0.0760	0.0750	0.0530	0.0520	4	0.0280	0.0270	0.656	0.469	1.844	1.656	...	...	0.062	0.008	
0.096	0.0960	0.0950	0.0790	0.0775	6	0.0240	0.0230	0.703	0.516	1.969	1.781	...	...	0.078	0.008	
0.111	0.1110	0.1100	0.0940	0.0925	6	0.0280	0.0270	0.750	0.562	2.094	1.906	...	...	0.094	0.009	
0.133	0.1330	0.1310	0.1140	0.1120	6	0.0340	0.0320	0.797	0.609	2.219	2.031	3.656	3.469	0.125	0.014	
0.145	0.1450	0.1435	0.1240	0.1225	6	0.0355	0.0340	0.844	0.656	2.344	2.156	3.844	3.656	0.125	0.015	
0.168	0.1680	0.1660	0.1440	0.1420	6	0.0410	0.0390	0.891	0.703	2.469	2.281	4.031	3.844	0.156	0.016	
0.183	0.1830	0.1815	0.1580	0.1565	6	0.0440	0.0425	0.938	0.750	2.594	2.406	4.219	4.031	0.156	0.016	
0.216	0.2160	0.2145	0.1840	0.1825	6	0.0550	0.0535	1.031	0.844	2.844	2.657	4.594	4.406	0.188	0.022	
0.251	0.2510	0.2495	0.2140	0.2125	6	0.0655	0.0640	1.125	0.938	3.094	2.906	4.969	4.781	0.219	0.024	
0.291	0.2910	0.2895	0.2460	0.2445	6	0.0775	0.0760	1.219	1.031	3.344	3.156	5.344	5.156	0.250	0.030	

ASME B18.3-1998

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

TABLE 9 DIMENSIONS OF SPLINE KEYS AND BITS (CONT'D)

Nominal Key and Socket Size	M		W		N		B		C				R	K	
	Major Diameter		Minor Diameter		Number of Spline		Width of Space		Length of Short Arm		Length of Long Arm		Radius of Bend	Chamfer	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.			
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
0.372	0.3720	0.3705	0.3100	0.3085	6	0.0975	0.0960	1.344	1.156	3.844	3.656	6.094	5.906	0.312	0.032
0.454	0.4540	0.4525	0.3770	0.3755	6	0.1185	0.1170	1.469	1.281	4.344	4.156	6.844	6.656	0.375	0.044
0.595	0.5950	0.5935	0.5000	0.4975	6	0.1460	0.1445	1.719	1.531	5.344	5.156	8.344	8.156	0.500	0.050
0.620	0.6200	0.6175	0.5240	0.5215	6	0.1615	0.1590	1.844	1.656	5.844	5.656	9.094	8.906	0.500	0.053
0.698	0.6980	0.6955	0.5930	0.5905	6	0.1805	0.1780	1.844	1.656	5.844	5.656	...	...	0.562	0.055
0.790	0.7900	0.7875	0.6740	0.6715	6	0.1975	0.1950	1.969	1.781	6.344	6.156	...	...	0.625	0.070
See Notes															1

(For additional requirements refer to notes below.)

NOTES:

- (1) Each end shall be square with the axis of each arm within 4 deg, and edges may be sharp or chamfered at the option of the manufacturer. The chamfer shall not exceed the values listed.
- (2) Material (Steel Alloy). The spline keys shall be fabricated from an alloy steel having two or more of the following alloying elements: chromium, nickel, molybdenum, or vanadium, in sufficient quantity to assure that the specified minimum hardness of 48 HRC at the surface for sizes up to and including 0.372 in., and 45 HRC for sizes over 0.372 in., is met when spline keys are hardened by quenching from the austenitizing temperature and tempered.
- (3) For plated keys, all dimensions are before plating.
- (4) For applicability of keys to various socket screw types and sizes, see Appendix B, Table B2.
- (5) Bits are available, but lengths have not been standardized.
- (6) Designation. Spline Keys shall be designated by the following data in the sequence shown: nominal key size; product name; series; and protective coating, if required. See examples below:
0.111 Spline Key, Short Series
0.372 Spline Key, Long Series, Nickel Plated

APPENDIX I

GAGES AND GAGING FOR HEXAGON AND SPLINE SOCKETS

(This Appendix is mandatory and is placed after the main text for convenience.)

GENERAL

The gages specified herein are intended for use in determining the acceptability of sockets up to and including the 1 in. nominal hexagon socket size and the 0.790 in. nominal spline socket size. Suitability of hexagon sockets of nominal sizes larger than 1 in. shall be determined by direct measurement for various technical and economic reasons. For dimensions of gages for sockets and spline sockets, see Tables IA and IB.

GAGING OF HEXAGON SOCKETS

Hexagon sockets in screws shall allow the GO member of the gage to enter freely to the minimum key engagement depths specified in the dimensional tables for the respective screw types.

For hexagon sockets that are not chamfered, the NOT GO gage member shall not enter any of the three across-flat dimensions of the socket for nominal socket sizes of $\frac{1}{8}$ in. and larger, and the hexagonal NOT GO gage member shall not enter the socket for nominal socket sizes smaller than $\frac{1}{8}$ in.

For chamfered hexagon sockets, the NOT GO gage member shall be permitted to enter only to a depth equivalent to 10% of the nominal socket size for nominal socket sizes up to and including $\frac{1}{16}$ in., and to 7.5% of the nominal socket sizes for larger sockets.

GAGING OF SPLINE SOCKETS

Spline sockets in screws shall allow the GO member of the gage to enter freely to the minimum key engagement depths specified in the dimensional tables for the respective screw types.

For spline sockets that are not chamfered, the NOT GO gage member shall not enter the socket.

For chamfered spline sockets, the NOT GO gage member shall be permitted to enter only to a depth equivalent to 10% of the nominal socket size for nominal socket sizes up to and including 0.060 in., and to 7.5% of the nominal socket size for larger sockets.

GAGES

Gages shall be made from gage steel, hardened and tempered to 60 HRC minimum. They shall be thermally stabilized and given suitable surface treatment to obtain maximum abrasion resistance.

The form of hexagonal and spline gage members shall be within the tolerance zone specified. See ASME Y14.5M, Engineering Drawing and Related Documentation Practices, Dimensioning and Tolerancing.

The surface roughness on hexagon and spline flats shall be 8 μ in. (arithmetical average) maximum. See ASME B46.1, Surface Texture.

The gage handles shall conform to ASME B47.1, Gage Blanks.

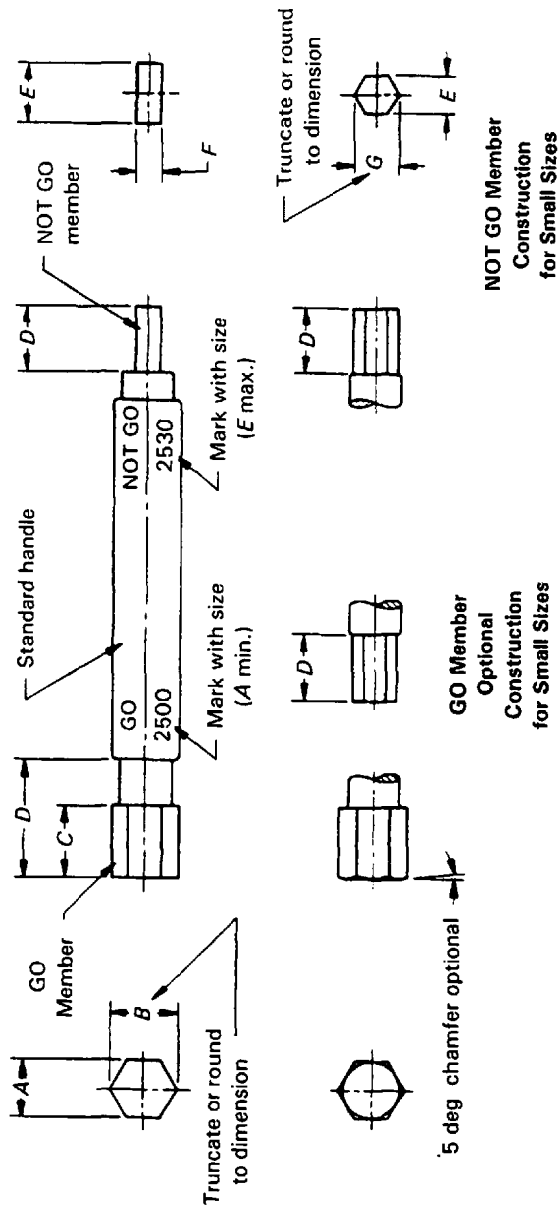


TABLE IA DIMENSIONS OF GAGES FOR HEXAGON SOCKETS

Nominal Socket Size	A		B		C		D		E		F		G	
	GO Gage Width Across Flats		GO Gage Width Across Corners		GO Gage Length		Usable Gage Length		NOT GO Gage Width		NOT GO Gage Thickness		NOT GO Gage Width Across Corners	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
...	0.028	0.0281	0.0280	0.0314	0.0316	0.0314	0.062	0.062	0.0285	0.0284	...	...	0.0308	0.0303
...	0.035	0.0351	0.0350	0.0393	0.0395	0.0393	0.093	0.093	0.0355	0.0354	...	...	0.0388	0.0381
...	0.050	0.0501	0.0500	0.0560	0.0562	0.0560	0.187	0.187	0.0510	0.0509	...	...	0.0550	0.0545
1/16	0.062	0.0626	0.0625	0.0701	0.0703	0.0701	0.187	0.187	0.0635	0.0634	...	...	0.0688	0.0683
5/64	0.078	0.0782	0.0781	0.0880	0.0882	0.0880	0.187	0.187	0.0791	0.0790	...	...	0.0862	0.0857
3/32	0.094	0.0939	0.0937	0.1058	0.1060	0.1058	0.250	0.250	0.0952	0.0950	...	...	0.1036	0.1031
7/64	0.109	0.1096	0.1094	0.1238	0.1240	0.1238	0.250	0.250	0.1111	0.1109	...	...	0.1212	0.1207
1/8	0.125	0.1252	0.1250	0.1418	0.1420	0.1418	0.250	0.250	0.1270	0.1268	0.057	0.055	...	...
9/64	0.141	0.1408	0.1406	0.1593	0.1595	0.1593	0.250	0.250	0.1426	0.1424	0.064	0.062	...	...
5/32	0.156	0.1564	0.1562	0.1774	0.1776	0.1774	0.250	0.250	0.1587	0.1585	0.071	0.069	...	...
3/16	0.188	0.1877	0.1875	0.2137	0.2137	0.2135	0.250	0.250	0.1900	0.1898	0.088	0.086	...	...
7/32	0.219	0.2189	0.2187	0.2490	0.2492	0.2490	0.250	0.250	0.2217	0.2215	0.102	0.100	...	...

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE IA DIMENSIONS OF GAGES FOR HEXAGON SOCKETS (CONT'D)

Nominal Socket Size	A		B		C		D		E		F		G	
	GO Gage Width Across Flats		GO Gage Width Across Corners		GO Gage Length		Usable Gage Length		NOT GO Gage Width		NOT GO Gage Thickness		NOT GO Gage Width Across Corners	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1/4	0.2502	0.2500	0.2848	0.2845	0.312	0.312	0.500	0.500	0.2530	0.2528	0.117	0.115	...	...
5/16	0.3127	0.3125	0.3573	0.3570	0.312	0.312	0.625	0.625	0.3160	0.3158	0.150	0.148	...	...
3/8	0.3752	0.3750	0.4288	0.4285	0.500	0.500	0.750	0.750	0.3790	0.3788	0.180	0.178	...	...
7/16	0.4377	0.4375	0.5008	0.5005	0.500	0.500	0.875	0.875	0.4420	0.4418	0.211	0.209	...	...
1/2	0.5002	0.5000	0.5718	0.5715	0.500	0.500	1.000	1.000	0.5050	0.5048	0.241	0.239	...	...
9/16	0.5627	0.5625	0.6424	0.6420	0.750	0.750	1.125	1.125	0.5680	0.5678	0.269	0.267	...	...
5/8	0.6252	0.6250	0.7150	0.7146	0.750	0.750	1.250	1.250	0.6310	0.6308	0.302	0.300	...	...
3/4	0.7502	0.7500	0.8585	0.8580	0.750	0.750	1.500	1.500	0.7570	0.7568	0.364	0.362	...	...
7/8	0.8752	0.8750	1.0025	1.0020	0.875	0.875	1.750	1.750	0.8850	0.8848	0.423	0.421	...	...
1	1.0002	1.0000	1.1475	1.1470	1.000	1.000	2.000	2.000	1.0200	1.0198	0.489	0.487	...	...

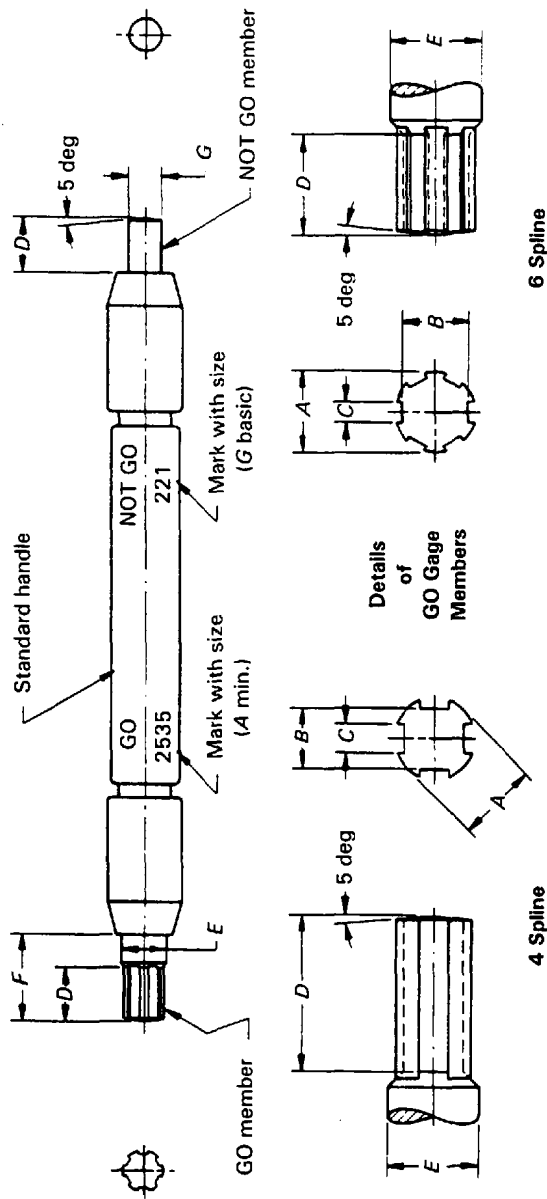


TABLE IB DIMENSIONS OF GAGES FOR SPLINE SOCKETS

Nominal Socket Size	Number of Splines	A		B		C		D		E		F		G	
		GO Gage Major Diameter		GO Gage Minor Diameter		GO Gage Space Width		Gage Length		Shoulder Diameter		Length		NOT GO Gage Diameter	
		Max.	Min.	Max.	Min.	Max.	Min.	Min.	Min.	±0.0020	Min.	Min.	Min.	Basic (1)	Basic (1)
0.033	4	0.0337	0.0335	0.0252	0.0250	0.0125	0.0123	0.0625	0.0625	0.0350	0.093	0.093	0.0275	0.0275	0.0275
0.048	4	0.0487	0.0485	0.0372	0.0370	0.0175	0.0173	0.0625	0.0625	0.0520	0.187	0.187	0.0395	0.0395	0.0395
0.048	6	0.0487	0.0485	0.0397	0.0395	0.0115	0.0113	0.0625	0.0625	0.0520	0.187	0.187	0.0410	0.0410	0.0410
0.060	6	0.0607	0.0605	0.0497	0.0495	0.0145	0.0143	0.0625	0.0625	0.0625	0.187	0.187	0.0510	0.0510	0.0510
0.069	4	0.0697	0.0695	0.0517	0.0515	0.0215	0.0213	0.0625	0.0625	0.0700	0.187	0.187	0.0545	0.0545	0.0545
0.072	6	0.0727	0.0725	0.0627	0.0625	0.0165	0.0163	0.0625	0.0625	0.0730	0.187	0.187	0.0640	0.0640	0.0640
0.076	4	0.0767	0.0765	0.0547	0.0545	0.0235	0.0233	0.0625	0.0625	0.0770	0.187	0.187	0.0575	0.0575	0.0575
0.096	6	0.0967	0.0965	0.0797	0.0795	0.0225	0.0223	0.0938	0.0938	0.0980	0.250	0.250	0.0820	0.0820	0.0820
0.111	6	0.1127	0.1125	0.0957	0.0955	0.0255	0.0253	0.0938	0.0938	0.1130	0.250	0.250	0.0980	0.0980	0.0980
0.133	6	0.1347	0.1345	0.1157	0.1155	0.0305	0.0303	0.0938	0.0938	0.1360	0.250	0.250	0.1180	0.1180	0.1180
0.145	6	0.1467	0.1465	0.1257	0.1255	0.0325	0.0323	0.1250	0.1250	0.1470	0.250	0.250	0.1280	0.1280	0.1280
0.168	6	0.1707	0.1705	0.1467	0.1465	0.0365	0.0363	0.0938	0.0938	0.1719	0.250	0.250	0.1500	0.1500	0.1500

SOCKET CAP, SHOULDER, AND SET SCREWS,
HEX AND SPLINE KEYS (INCH SERIES)

ASME B18.3-1998

TABLE IB DIMENSIONS OF GAGES FOR SPLINE SOCKETS (CONT'D)

Nominal Socket Size	Number of Splines	A		B		C		D		E		F		NOT GO Gage Diameter
		GO Gage Major Diameter		GO Gage Minor Diameter		GO Gage Space Width		Gage Length		Shoulder Diameter		Length		
		Max.	Min.	Max.	Min.	Max.	Min.	Min.	Min.	±0.0020	Min.	Min.		
0.183	6	0.1857	0.1855	0.1607	0.1605	0.0395	0.0393	0.1875	0.1875	0.1875	0.375	0.375	0.1630	
0.216	6	0.2187	0.2185	0.1877	0.1875	0.0505	0.0503	0.1875	0.1875	0.2187	0.437	0.437	0.1900	
0.251	6	0.2537	0.2535	0.2187	0.2185	0.0605	0.0603	0.2500	0.2500	0.2570	0.500	0.500	0.2210	
0.291	6	0.2957	0.2955	0.2517	0.2515	0.0685	0.0683	0.2500	0.2500	0.2968	0.625	0.625	0.2540	
0.372	6	0.3767	0.3765	0.3157	0.3155	0.0925	0.0923	0.3750	0.3750	0.3770	0.750	0.750	0.3190	
0.454	6	0.4597	0.4595	0.3827	0.3825	0.1125	0.1123	0.3750	0.3750	0.4687	0.875	0.875	0.3860	
0.595	6	0.6007	0.6005	0.5057	0.5055	0.1385	0.1383	0.5000	0.5000	0.6094	1.000	1.000	0.5090	
0.620	6	0.6267	0.6265	0.5307	0.5305	0.1495	0.1493	0.5000	0.5000	0.6406	1.000	1.000	0.5350	
0.698	6	0.7047	0.7045	0.5997	0.5995	0.1685	0.1683	0.5000	0.5000	0.7187	1.125	1.125	0.6040	
0.790	6	0.7967	0.7965	0.6807	0.6805	0.1895	0.1893	0.5625	0.5625	0.7969	1.250	1.250	0.6850	

NOTE:

(1) Class Y plus gage tolerances shall apply

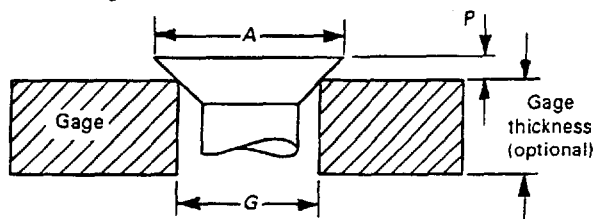
APPENDIX II

PROTRUSION GAGING OF FLAT COUNTERSUNK HEADS

(This Appendix is mandatory and is placed after the main text for convenience.)

Suitability of flat countersunk head screws for application in countersinks designed to the principal dimensions of the screws shall be determined by use of a protrusion gage as illustrated below.

The protrusion dimensions and the gage diameters are specified in Table 2A. Adjustment in the protrusion limits must be made when the gage diameter varies from the gage size specified. The following formula shall be used to calculate the adjusted maximum and minimum protrusion limits.



Adjustment Formula

$$P' = P \times (A - G') / (A - G)$$

where

- A = theoretical head diameter
- G = tabulated maximum gage diameter
- G' = actual gage diameter
- P = tabulated protrusion limit
- P' = adjusted protrusion limit based on actual gage diameter

To insure adequate service life, the protrusion gage should be made of tool steel having a hardness of not less than Rockwell C 60 (60 HRC).

If heads meet the original flushness requirements in a flushness gage, they are acceptable. The flushness gage must meet, or be more discriminating than, the original flushness gage requirement (flush in an 82 deg by "A" diameter countersink).

APPENDIX III STRAIGHTNESS GAGE AND GAGING

(This Appendix is mandatory and is placed after the main text for convenience.)

All screws shall be gaged by use of the adjustable rail gage that shall be adjusted to provide a parallel space between the rails equal to D_e by obtaining common readings on both micrometer heads. The adjustable rail shall then be locked in place by tightening securing screws.

The product shall then be inserted between rails, excluding a length equal to two diameters under the head. The product shall be rotated by hand a full 360 deg. Any interference occurring between the product and the gage which is sufficient to prevent rotation shall indicate excessive camber.

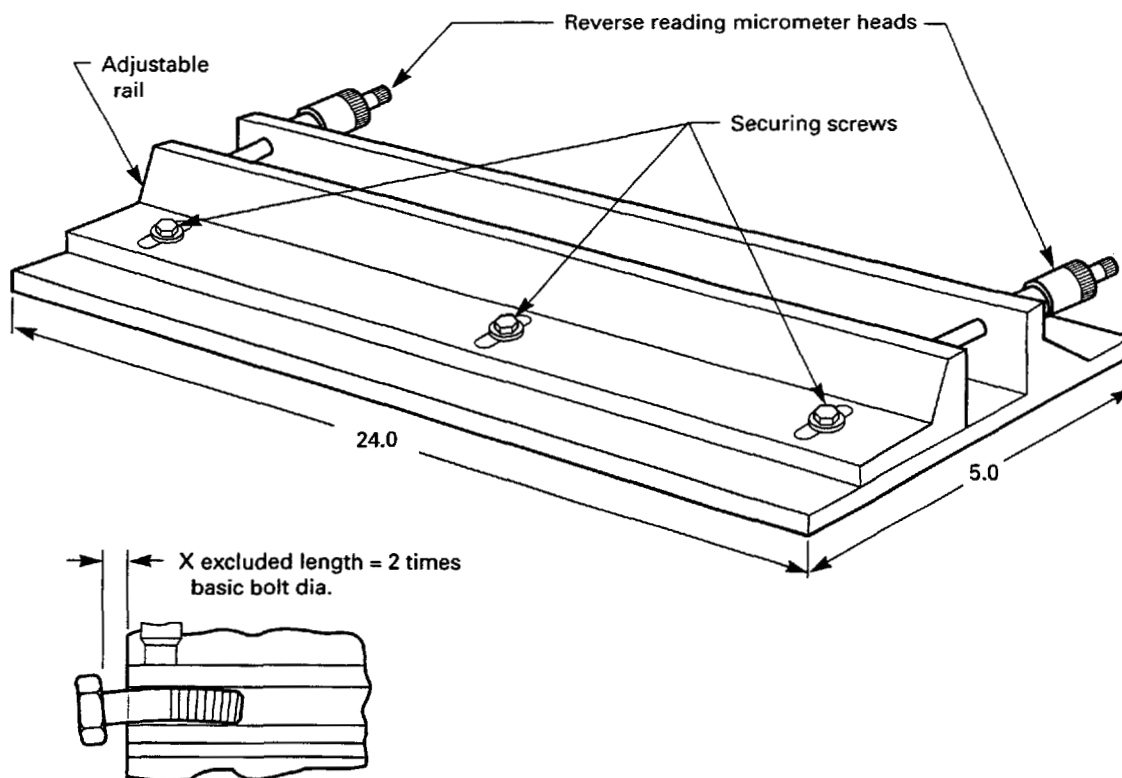


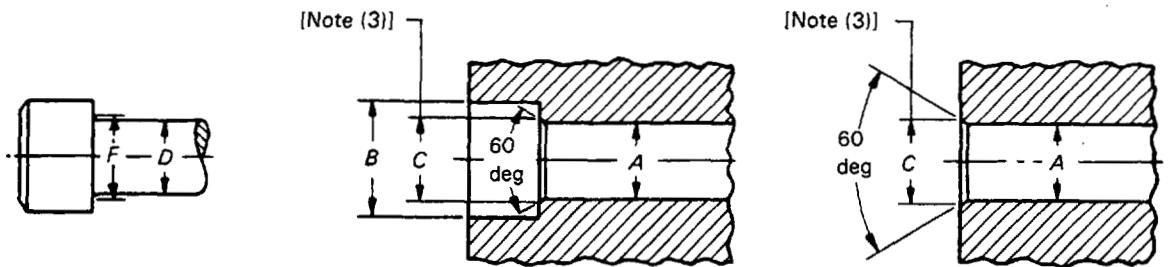
FIG. III-A TYPICAL STRAIGHTNESS GAGE

APPENDIX A

DRILL AND COUNTERBORE SIZES FOR SOCKET HEAD CAP SCREWS

(This Appendix is not part of ASME B18.3-1998 and is included for informational purposes only.)

Table A1 appears on the following page.


TABLE A1 DRILL AND COUNTERBORE SIZES FOR SOCKET HEAD CAP SCREWS (1960 SERIES)

		A		B		C
		Nominal Drill Size				
		Close Fit		Normal Fit		
Nominal Size or Basic Screw Diameter		Number or Fractional Size	Decimal Size	Number or Fractional Size	Decimal Size	Countersink Diameter <i>F</i> (max.) (See Table 1B)
0	0.0600	51	0.067	49	0.073	$\frac{1}{8}$ 0.074
1	0.0730	46	0.081	43	0.089	$\frac{5}{32}$ 0.087
2	0.0860	$\frac{3}{32}$	0.094	36	0.106	$\frac{3}{16}$ 0.102
3	0.0990	36	0.106	31	0.120	$\frac{7}{32}$ 0.115
4	0.1120	$\frac{1}{8}$	0.125	29	0.136	$\frac{7}{32}$ 0.130
5	0.1250	$\frac{9}{64}$	0.141	23	0.154	$\frac{1}{4}$ 0.145
6	0.1380	23	0.154	18	0.170	$\frac{9}{32}$ 0.158
8	0.1640	15	0.180	10	0.194	$\frac{5}{16}$ 0.188
10	0.1900	5	0.206	2	0.221	$\frac{3}{8}$ 0.218
$\frac{1}{4}$	0.2500	$\frac{17}{64}$	0.266	$\frac{9}{32}$	0.281	$\frac{7}{16}$ 0.278
$\frac{5}{16}$	0.3125	$\frac{21}{64}$	0.328	$\frac{11}{32}$	0.344	$\frac{17}{32}$ 0.346
$\frac{3}{8}$	0.3750	$\frac{25}{64}$	0.391	$\frac{13}{32}$	0.406	$\frac{5}{8}$ 0.415
$\frac{7}{16}$	0.4375	$\frac{29}{64}$	0.453	$\frac{15}{32}$	0.469	$\frac{23}{32}$ 0.483
$\frac{1}{2}$	0.5000	$\frac{33}{64}$	0.516	$\frac{17}{32}$	0.531	$\frac{13}{16}$ 0.552
$\frac{5}{8}$	0.6250	$\frac{41}{64}$	0.641	$\frac{21}{32}$	0.656	1 0.689
$\frac{3}{4}$	0.7500	$\frac{49}{64}$	0.766	$\frac{25}{32}$	0.781	1 $\frac{3}{16}$ 0.828
$\frac{7}{8}$	0.8750	$\frac{57}{64}$	0.891	$\frac{29}{32}$	0.906	1 $\frac{3}{8}$ 0.963
1	1.0000	1 $\frac{1}{64}$	1.016	1 $\frac{1}{32}$	1.031	1 $\frac{5}{8}$ 1.100
1 $\frac{1}{4}$	1.2500	1 $\frac{9}{32}$	1.281	1 $\frac{5}{16}$	1.312	2 1.370
1 $\frac{1}{2}$	1.5000	1 $\frac{17}{32}$	1.531	1 $\frac{9}{16}$	1.562	2 $\frac{3}{8}$ 1.640
1 $\frac{3}{4}$	1.7500	1 $\frac{25}{32}$	1.781	1 $\frac{13}{16}$	1.812	2 $\frac{3}{4}$ 1.910
2	2.0000	2 $\frac{1}{32}$	2.031	2 $\frac{1}{16}$	2.062	3 $\frac{1}{8}$ 2.180
See Notes		1		2		3

(For additional information refer to notes on page 61.)

NOTES TO TABLE A1**NOTES:**

- (1) Close Fit. The close fit is normally limited to holes for those lengths of screws that are threaded to the head (see Table 1C) in assemblies where only one screw is to be used or where two or more screws are to be used and the mating holes are to be produced either at assembly or by matched and coordinated tooling.
- (2) Normal Fit. The normal fit is intended for screws of relatively long length or for assemblies involving two or more screws where the mating holes are to be produced by conventional tolerancing methods. It provides for the maximum allowable eccentricity of the longest standard screws and for certain variations in the parts to be fastened, such as: deviations in hole straightness, angularity between the axis of the tapped hole and that of the hole for the shank, differences in center distances of the mating holes, etc.
- (3) Countersink. It is considered good practice to countersink or break the edges of holes that are smaller than F (max.) (see Table 1B) in parts having a hardness which approaches, equals, or exceeds the screw hardness. If such holes are not countersunk, the heads of screws may not seat properly or the sharp edges on holes may deform the fillets on screws thereby making them susceptible to fatigue in applications involving dynamic loading. The countersink or corner relief, however, should not be larger than is necessary to insure that the fillet on the screw is cleared. Normally, the diameter of countersink does not have to exceed F (max.) (see Table 1B). Countersinks or corner reliefs in excess of this diameter reduce the effective bearing area and introduce the possibility of imbedment where the parts to be fastened are softer than the screws or brinelling or flaring of the heads of the screws where the parts to be fastened are harder than the screws.

APPENDIX B

APPLICABILITY OF KEYS AND BITS TO VARIOUS SOCKET SCREW TYPES AND SIZES

(This Appendix is not part of ASME B18.3-1998 and is included for informational purposes only.)

TABLE B1 APPLICABILITY OF HEXAGON KEYS AND BITS

Nominal Key or Bit Size		Nominal Screw Sizes				
		Cap Screws	Flat Countersink Head Cap Screws	Button Head Cap Screws	Shoulder Screws	Set Screws
...	0.028	...	...	...	...	0
...	0.035	...	0	0	...	1 and 2
...	0.050	0	1 and 2	1 and 2	...	3 and 4
$\frac{1}{16}$	0.062	1	3 and 4	3 and 4	...	5 and 6
$\frac{5}{64}$	0.078	2 and 3	5 and 6	5 and 6	...	8
$\frac{3}{32}$	0.094	4 and 5	8	8	...	10
$\frac{7}{64}$	0.109	6	...	...	...	...
$\frac{1}{8}$	0.125	...	10	10	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{9}{64}$	0.141	8	...	...	...	...
$\frac{5}{32}$	0.156	10	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$
$\frac{3}{16}$	0.188	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{8}$
$\frac{7}{32}$	0.219	...	$\frac{3}{8}$	$\frac{3}{8}$	...	$\frac{7}{16}$
$\frac{1}{4}$	0.250	$\frac{5}{16}$	$\frac{7}{16}$	...	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{5}{16}$	0.312	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$
$\frac{3}{8}$	0.375	$\frac{7}{16}$ and $\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$
$\frac{7}{16}$	0.438	...	...	...	...	...
$\frac{1}{2}$	0.500	$\frac{5}{8}$	$\frac{3}{4}$	...	1	$\frac{7}{8}$
$\frac{9}{16}$	0.562	...	$\frac{7}{8}$	...	...	1 and $\frac{1}{8}$
$\frac{5}{8}$	0.625	$\frac{3}{4}$	1	...	$\frac{1}{4}$	$\frac{1}{4}$ and $\frac{1}{8}$
$\frac{3}{4}$	0.750	$\frac{7}{8}$ and 1	$1\frac{1}{8}$	...	...	$1\frac{1}{2}$
$\frac{7}{8}$	0.875	$1\frac{1}{8}$ and $1\frac{1}{4}$	$1\frac{1}{4}$ and $1\frac{3}{8}$	...	$1\frac{1}{2}$	...
1	1.000	$1\frac{3}{8}$ and $1\frac{1}{2}$	$1\frac{1}{2}$	...	$1\frac{3}{4}$	$1\frac{3}{4}$ and 2
$1\frac{1}{4}$	1.250	$1\frac{3}{4}$	...	...	2	...
$1\frac{1}{2}$	1.500	2	...	...	...	...
$1\frac{3}{4}$	1.750	$2\frac{1}{4}$ and $2\frac{1}{2}$	...	...	...	...
2	2.000	$2\frac{3}{4}$	...	...	...	...
$2\frac{1}{4}$	2.250	3 and $3\frac{1}{4}$	...	...	...	...
$2\frac{3}{4}$	2.750	$3\frac{1}{2}$ and $3\frac{3}{4}$	...	...	...	...
3	3.000	4	...	...	...	...

TABLE B2 APPLICABILITY OF SPLINE KEYS AND BITS

Nominal Key Size	Nominal Screw Sizes			
	Cap Screws	Flat Countersunk Head Cap Screws	Button Head Cap Screws	Set Screws
0.033	...	...	...	0 and 1
0.048	...	0	0	2 and 3
0.060	0	1 and 2	1 and 2	4
0.069	...	...	...	5
0.072	1	3 and 4	3 and 4	5 and 6
0.076	...	...	...	6
0.096	2 and 3	5 and 6	5 and 6	8
0.111	4 and 5	8	8	10
0.133	6	...	...	...
0.145	...	10	10	1/4
0.168	8	...	...	...
0.183	10	1/4	1/4	5/16
0.216	1/4	5/16	5/16	3/8
0.251	...	3/8	3/8	7/16
0.291	5/16	7/16	...	1/2
0.372	3/8	1/2	1/2	5/8
0.454	7/16 and 1/2	5/8 and 3/4	5/8	3/4
0.595	5/8	...	...	7/8
0.620	3/4	...	...	...
0.698	7/8	...	...	...
0.790	1	...	...	...

APPENDIX C

FORMULAS FOR DIMENSIONS

(This Appendix is not part of ASME B18.3-1998 and is included for informational purposes only.)

Hexagon and Spline Socket Head Cap Screws

Body Diameter D , Table 1A

D (max.) = basic or nominal size (see Table 1A for values)

D (min.) = minimum major diameter Class 3A UNRF threads for sizes 0 through 1 in.
= minimum major diameter Class 3A UNRC threads for sizes over 1 in.

Head Diameter A , Table 1A

A (max.) = see Table 1A for value for sizes 0 through 10

= $1.50D$ (max.) for sizes $\frac{1}{4}$ in. through 4 in.

A (max.) = A (max.) - $0.021 \sqrt{D$ (max.)

Head Height H , Table 1A

H (max.) = D (max.)

H (min.) = H (max.) - $0.012 \sqrt{D$ (max.)

Key Engagement T , Table 1A

T (min.) = $0.50H$ (max.) - 0.005

Wall Thickness G , Table 1A

G (min.) = $0.34H$ (max.) for sizes 0 through 10

= $0.38H$ (max.) for sizes $\frac{1}{4}$ in. through 4 in.

Functional Limits for Runout of Head, Body, and Thread, Table 1E

Limits based on:

$0.0025L + \sqrt{D}$ for sizes up to and including 1 in. with a maximum of 0.025 in.

$0.0025L$ for sizes over 1 in. with a maximum of 0.060 in.

Hexagon and Spline Socket Flat Countersunk Head Cap Screws

Body Diameter D , Table 2A

D (max.) = basic or nominal size (see Table 2A for values)

D (min.) = minimum major diameter Class 3A UNRF threads for sizes 0 through 1 in.
= minimum major diameter Class 3A UNRC threads for sizes over 1 in.

Head Diameter A , Table 2A

A (max.) Theor. Sharp = no formula for sizes 0 through 3 (see Table 2A for values)

= $2D$ (max.) + 0.031 for sizes 4 in. through $\frac{3}{8}$ in.

= $2D$ (max.) - 0.031 for $\frac{7}{16}$ in. size

= $2D$ (max.) - 0.062 for sizes $\frac{1}{2}$ in. through 1 $\frac{1}{2}$ in.

Head Height H , Table 2A

$$H \text{ (ref.)} = \frac{A \text{ (max.)} - D \text{ (max.)}}{2} \cot 41^\circ$$

Head Protrusion, Table 2A

Maximum = $.5(A \text{ max.} - F \text{ max.}) \tan 49^\circ - .5(G \text{ min.} - F \text{ max.}) \tan 50^\circ$

Minimum = $.5(A \text{ max.} - G \text{ min.}) \tan 49^\circ - f$

where

f = original flushness tolerance

Original Flushness Tolerance

Nominal Size		Flushness Tolerance
0	0.0600	0.006
1	0.0730	0.007
2	0.0860	0.008
3	0.0990	0.010
4	0.1120	0.011
5	0.1250	0.012
6	0.1380	0.013
8	0.1640	0.014
10	0.1900	0.015
$\frac{1}{4}$	0.2500	0.016
$\frac{5}{16}$	0.3125	0.017
$\frac{3}{8}$	0.3750	0.018
$\frac{7}{16}$	0.4375	0.018
$\frac{1}{2}$	0.5000	0.018
$\frac{5}{8}$	0.6250	0.022
$\frac{3}{4}$	0.7500	0.024
$\frac{7}{8}$	0.8750	0.025
1	1.0000	0.028
$1\frac{1}{8}$	1.1250	0.031
$1\frac{1}{4}$	1.2500	0.035
$1\frac{3}{8}$	1.3750	0.038
$1\frac{1}{2}$	1.5000	0.042

Key Engagement T , Table 2A

T (min.) = $0.68H - 0.005$ for sizes 0 through 3
 = $0.68H$ for sizes over 3 in. through $\frac{5}{8}$ in.
 = $0.53H$ approximately for sizes $\frac{3}{4}$ in. through $1\frac{1}{2}$ in.

Hexagon and Spline Socket Button Head Cap Screws

Head Diameter A , Table 3

A (max.)¹ = $1.90D$ for sizes 0 through 10
 = $1.75D$ for sizes $\frac{1}{4}$ in. through $\frac{1}{2}$ in.
 = $1.60D$ for $\frac{5}{8}$ in. size

Head Height H , Table 3

H (max.)¹ = $0.53D$ (min.)

Key Engagement T , Table 3

T (min.) = $0.56J$ (min.)

¹ Where D is the basic diameter of screw.

Hexagon Socket Head Shoulder Screws

Shoulder Diameter D , Table 4

D (max.) = nominal size - 0.002

D (min.) = D (max.) - 0.002

Head Diameter A , Table 4

A (max.) = no formula (see Table 4 for values)

A (min.) = no formula (see Table 4 for values)

Head Height H , Table 4

H (max.) = 0.50 (nominal size) + 0.0625 for sizes $\frac{1}{4}$ through $\frac{5}{8}$ in.
 = 0.50 (nominal size) + 0.125 for sizes $\frac{3}{4}$ in. through $1\frac{1}{4}$ in.

Thread Neck Width I , Table 4

I (max.) = 2.00 UNC thread pitches

Hexagon and Spline Socket Set Screws

Key Engagement, T_H and T_S , Table 5A

T_H (min.) = no formula for sizes 0 through 10 (see Table 5A for values)

= J (nom.) for sizes $\frac{1}{4}$ through 2 in.

T_S (min.)¹ = no formula for sizes 0 through 10 (see Table 5A for values)

= $0.50D$ for sizes $\frac{1}{4}$ through $\frac{3}{4}$ in.

= $0.573D$ for $\frac{7}{8}$ in. size

Oval Point Radius R , Table 5A

R (basic)¹ = $0.75D$

Half Dog Point Length Q , Table 5A

Q (basic)¹ = $0.25D$

Half Dog Point Diameter P , Table 5A

P (max.)¹ = $0.667D$ for sizes 0 through 10

= $0.75D - 0.031$ for sizes $\frac{1}{4}$ through $\frac{1}{2}$ in.

= $0.75D$ for sizes $\frac{5}{8}$ through 2 in.

Hexagon KeysRadius of Bend R , Table 8

$$\begin{aligned}
 R \text{ (min.)} &= \text{no formula (see Table 8 for key sizes} \\
 &\quad \text{0.028 through 0.050)} \\
 &= W \text{ (max.) for key sizes } \frac{1}{16} \text{ in. through} \\
 &\quad 1 \text{ in.}
 \end{aligned}$$

Spline KeysRadius of Bend R , Table 9

$$\begin{aligned}
 R \text{ (min.)}^2 &= \text{no formula (see Table 9 for key sizes} \\
 &\quad \text{0.033 through 0.133 and 0.168)} \\
 &= 0.50D \text{ for key sizes 0.145, 0.183} \\
 &\quad \text{through 0.454, and 0.620 through} \\
 &\quad \text{0.790} \\
 &= 0.50D + 0.062 \text{ for 0.595 key size}
 \end{aligned}$$

² Where D is the basic diameter of set screw in which socket size is used.

APPENDIX D

HEXAGON AND SPLINE SOCKET HEAD CAP SCREWS (1936 SERIES)

(This Appendix is not part of ASME B18.3-1998 and is included for informational purposes only.)

Prior to 1961, the 1936 Series of socket head cap screws were recognized as standard. The 1936 Series screws are no longer stocked by screw manufacturers and are now available only on special order. The major differences between the 1936 Series screws and the present standard screws (1960 Series) are that, for some sizes, the 1936 Series had smaller head diameters and/or socket sizes and/or different thread lengths. Users desiring additional information on the 1936 Series should refer to Appendix IV of ASA B18.3-1961, or should consult socket screw manufacturers.

AMERICAN NATIONAL STANDARDS FOR BOLTS, NUTS, RIVETS, SCREWS, WASHERS, AND SIMILAR FASTENERS

Small Solid Rivets	B18.1.1-1972(R1995)
Large Rivets	B18.1.2-1972(R1995)
Metric Small Solid Rivets	B18.1.3M-1983(R1995)
Square and Hex Bolts and Screws (Inch Series)	B18.2.1-1996
Square and Hex Nuts (Inch Series)	B18.2.2-1987(R1993)
Metric Hex Cap Screws	B18.2.3.1M-1979(R1995)
Metric Formed Hex Screws	B18.2.3.2M-1979(R1995)
Metric Heavy Hex Screws	B18.2.3.3M-1979(R1995)
Metric Hex Flange Screws	B18.2.3.4M-1984(R1995)
Metric Hex Bolts	B18.2.3.5M-1979(R1995)
Metric Heavy Hex Bolts	B18.2.3.6M-1979(R1995)
Metric Heavy Hex Structural Bolts	B18.2.3.7M-1979(R1995)
Metric Hex Lag Screws	B18.2.3.8M-1981(R1991)
Metric Heavy Hex Flange Screws	B18.2.3.9M-1984(R1995)
Square Head Bolts (Metric Series)	B18.2.3.10M-1996
Metric Hex Nuts, Style 1	B18.2.4.1M-1996
Metric Hex Nuts, Style 2	B18.2.4.2M-1979(R1995)
Metric Slotted Hex Nuts	B18.2.4.3M-1979(R1995)
Metric Hex Flange Nuts	B18.4.4.4M-1982(R1993)
Metric Hex Jam Nuts	B18.2.4.5M-1979(R1990)
Metric Heavy Hex Nuts	B18.2.4.6M-1979(R1990)
Fasteners for Use in Structural Applications	B18.2.6-1996
Socket Cap, Shoulder, and Set Screws, Hex and Spline Keys (Inch Series)	B18.3-1998
Socket Head Cap Screws (Metric Series)	B18.3.1M-1986(R1993)
Metric Series Hexagon Keys and Bits	B18.3.2M-1979(R1990)
Hexagon Socket Head Shoulder Screws (Metric Series)	B18.3.3M-1986(R1993)
Hexagon Socket Button Head Cap Screws (Metric Series)	B18.3.4M-1986(R1993)
Hexagon Socket Flat Countersunk Head Cap Screws (Metric Series)	B18.3.5M-1986(R1993)
Metric Series Socket Set Screws	B18.3.6M-1986(R1993)
Round Head Bolts (Inch Series)	B18.5-1990
Metric Round Head Short Square Neck Bolts	B18.5.2.1M-1996
Metric Round Head Square Neck Bolts	B18.5.2.2M-1982
Round Head Square Neck Bolts With Large Head (Metric Series)	B18.5.2.3M-1990
Wood Screws (Inch Series)	B18.6.1-1981(R1991)
Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws	B18.6.2-1972(R1993)
Machine Screws and Machine Screw Nuts	B18.6.3-1972(R1983)
Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series)	B18.6.4-1981(R1991)
Metric Thread Forming and Thread Cutting Tapping Screws	B18.6.5M-1986(R1993)
Metric Machine Screws	B18.6.7M-1985(R1993)
General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps	B18.7-1972(R1992)
Metric General Purpose Semi-Tubular Rivets	B18.7.1M-1984(R1992)
Clevis Pins and Cotter Pins (Inch Series)	B18.8.1-1994
Taper Pins, Dowel Pins, Straight Pins, Grooved Pins, and Spring Pins (Inch Series)	B18.8.2-1995
Spring Pins — Coiled Type (Metric Series)	B18.8.3M-1995
Spring Pins — Slotted (Metric Series)	B18.8.4M-1994
Machine Dowel Pins — Hardened Ground (Metric Series)	B18.8.5M-1994
Cotter Pins (Metric Series)	B18.8.6M-1995
Headless Clevis Pins (Metric Series)	B18.8.7M-1994
Headed Clevis Pins (Metric Series)	B18.8.8M-1994
Grooved Pins (Metric Series)	B18.8.9M-1998
Plow Bolts (Inch Series)	B18.9-1996
Track Bolts and Nuts	B18.10-1982(R1992)
Miniature Screws	B18.11-1961(R1992)
Glossary of Terms for Mechanical Fasteners	B18.12-1962(R1991)
Screw and Washer Assemblies — Sems (Inch Series)	B18.13-1996
Screw and Washer Assemblies — Sems (Metric Series)	B18.13.1M-1991

Forged Eyebolts.....	B18.15-1985(R1995)
Mechanical and Performance Requirements for Prevailing-Torque Type	
Steel Metric Hex Nuts and Hex Flange Nuts.....	B18.16.1M-1979(R1995)
Torque-Tension Test Requirements for Prevailing-Torque Type	
Steel Metric Hex Nuts and Hex Flange Nuts.....	B18.16.2M-1979(R1995)
Dimensional Requirements for Prevailing-Torque Type Steel	
Metric Hex Nuts and Hex Flange Nuts.....	B18.16.3M-1982(R1993)
Wing Nuts, Thumb Screws, and Wing Screws.....	B18.17-1968(R1983)
Inspection and Quality Assurance for General Purpose Fasteners.....	B18.18.1M-1987(R1993)
Inspection and Quality Assurance for High-Volume Machine Assembly Fasteners.....	B18.18.2M-1987(R1993)
Inspection and Quality Assurance for Special Purpose Fasteners.....	B18.18.3M-1987(R1993)
Inspection and Quality Assurance for Fasteners for Highly Specialized	
Engineered Applications.....	B18.18.4M-1987(R1993)
Inspection and Quality Assurance Plan Requiring In-Process Inspection and Controls.....	B18.18.5M-1998
Quality Assurance Plan for Fasteners Produced in a Third Party Accreditation System.....	B18.18.6M-1998
Quality Assurance Plan for Fasteners Produced in a Customer Approved Control Plan.....	B18.18.7M-1998
Lock Washers (Inch Series).....	B18.21.1-1994
Lock Washers (Metric Series).....	B18.21.2M-1994
Metric Plain Washers.....	B18.22M-1981(R1990)
Plain Washers.....	B18.22.1-1965(R1990)
Part Identifying Number (Pin) Code System Standard for B18 Externally	
Threaded Products.....	B18.24.1-1996
Square and Rectangular Keys and Keyways.....	B18.25.1M-1996
Woodruff Keys and Keyways.....	B18.25.2M-1996
Helical Coil Screw Thread Inserts (Inch Series).....	B18.29.1-1993

The ASME Publications Catalog shows a complete list of all the Standards published by the Society. For a complimentary catalog, or the latest information about our publications, call 1-800-THE-ASME (1-800-843-2763).